DIVISION OF INSPECTOR GENERAL
Ken Burke, CPA
Clerk of the Circuit Court and Comptroller
Pinellas County, Florida

FOLLOW-UP AUDIT OF TRAFFIC MANAGEMENT SYSTEM COORDINATION

Pinellas County
PUBLIC WORKS
Transportation

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August 18, 2021

Kelli Hammer Levy, Public Works Department Director

The Division of Inspector General has conducted a Follow-Up Audit of Traffic Management System Coordination. The objective of our review was to determine the implementation status of our previous recommendations. We obtained the audit purpose, background information, opportunities for improvement, and recommendations from the original audit report. We added the status of recommendation implementation to this follow-up audit report.

Of the 31 recommendations contained in the original audit report, we determined that 17 have been implemented, 5 have been partially implemented, 3 are considered acceptable alternatives, 4 have not been implemented, and 2 are no longer applicable. The status of each recommendation is presented in this follow-up report.

We appreciate the cooperation shown by the staff of the Public Works Department during the course of this review.

Respectfully Submitted,

Melissa Dondero

Melissa Dondero
Inspector General/Chief Audit Executive

cc: The Honorable Chairman and Members of the Board of County Commissioners
Barry Burton, County Administrator
Jill Silverboard, Deputy County Administrator/Chief of Staff
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Ken Burke, CPA, Clerk of the Circuit Court and Comptroller

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INTRODUCTION

Abbreviations

ADA	Americans with Disabilities Act
AI	Artificial intelligence
APWA	American Public Works Association
ATIS	Advanced Traveler Information System
ATMS	Advanced Traffic Management System
AVL	Automatic vehicle location
BCC	Board of County Commissioners
BTS	Business Technology Services
CCTV	Closed-circuit television
CIP	Capital Improvement Plan
County	Pinellas County
Countywide Agreement	ATMS/ITS Traffic Signal Interlocal Agreement between the County and Clearwater
DMS	Dynamic message sign
FDOT	Florida Department of Transportation
FY	Fiscal year
GFOA	Government Finance Officers Association
GIS	Geographic information system
HAR	Highway advisory radio
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation System
KPI	Key performance indicator

Maintenance Agreement	Interlocal Agreement for Maintenance of Traffic Control Signals and Devices between the County and Clearwater
NIST	National Institute of Standards and Technology
OAM	Office of Asset Management
OTI	Office of Technology and Innovation
PCC	Primary Control Center
PM	Preventive maintenance
PPT	Project Production Team
Public Works	Public Works Department
TAR	Traffic Advisory Report
TMC	Traffic Management Center
Transportation	Transportation Division
UPS	Uninterruptible power supply
Woolpert	Woolpert, Inc.

Scope and Methodology

We conducted a follow-up audit of the Traffic Management System Coordination. The purpose of our follow-up review was to determine the status of previous recommendations for improvement.

The purpose of the original audit was to:

1. Ensure adequate procedures were in place to operate the Advanced Traffic Management System (ATMS)/Intelligent Transportation System (ITS) and Traffic Management Center (TMC) effectively and efficiently.
2. Ensure Transportation employed a sufficient methodology to measure the performance of the ATMS/ITS and communicate key traffic flow statistics to the public.
3. Ensure adequate procedures were in place to perform preventive maintenance (PM), facilitate the reporting of traffic issues, investigate reported issues, and repair traffic signals in an effective and efficient manner.
4. Ensure there was adequate oversight of the inter-governmental contracts and/or agreements for the maintenance and operation of the traffic management system.

To determine the current status of our previous recommendations, we surveyed and/or interviewed management to determine the actual actions taken to implement recommendations for improvement. We performed limited testing to verify the implementation of the recommendations for improvement.

Our follow-up audit was conducted in accordance with the *International Standards for the Professional Practice of Internal Auditing* and the *Principles and Standards for Offices of Inspector General,* and, accordingly, included such tests of records and other auditing procedures, as we considered necessary in the circumstances. Our follow-up testing was performed during the months of February 2021 through July 2021. The original audit period was January 1, 2018, through March 31, 2019. However, transactions and processes reviewed were not limited by the audit period.

Overall Conclusion

Of the 31 recommendations in the original report, we determined that 17 were implemented, 5 were partially implemented, 3 were considered acceptable alternatives, 4 were not implemented, and 2 were no longer applicable. We commend management for implementation or partial implementation of most recommendations and encourage management to continue implementing the remaining recommendations.

Implementation Status Table

OFI NO.	PREVIOUS RECOMMENDATION	IMPLEMENTATION STATUS				
		Implemented	Acceptable Alternative	Partially Implemented	Not Implemented	No Longer Applicable
1	***The Advanced Traffic Management System Master Plan Was Outdated.***					
A	Complete an updated ATMS Master Plan. The updated plan should include the current status of the ATMS/ITS implementation and the future goals of the traffic management system, including the associated costs to achieve those goals. The ATMS Master Plan should be reviewed and updated periodically as recommended by best practices.			✓		
B	Complete efforts to address the remaining recommendations from the 2008 ATMS Master Plan as follows: • Complete the selection and implementation of the new central traffic control software • Complete installation of UPS equipment and backup batteries on all traffic cabinets and initiate communication between the UPS equipment and the traffic control software • Select, purchase, and install the optimal vehicle detection technology • Perform an analysis and make a decision on the implementation of HAR • Seek the required funding, collaborating with Safety and Emergency Services where feasible, to purchase and upgrade the emergency vehicle preemption technology			✓		
2	***The Transportation Countywide And Maintenance Interlocal Agreements With Clearwater Contained Outdated And Unclear Information.***					
A	Work with Clearwater Traffic Operations to explore the feasibility of updating the Countywide ATMS/ITS Traffic Signal Interlocal Agreement and the Interlocal Agreement for Maintenance of Traffic Control Signals and Devices to bring both agreements current. The agreements, at a minimum,			✓		

OFI NO.	PREVIOUS RECOMMENDATION	IMPLEMENTATION STATUS				
		Implemented	Acceptable Alternative	Partially Implemented	Not Implemented	No Longer Applicable
	should provide information and guidance on the following topics, as applicable: • Status of the overall ATMS/ITS system implementation • PCC Advisory Committee, or similar, and associated position composition and responsibilities • Current maintenance standards • A comprehensive list of maintained devices along with associated agreed responsibility for maintenance and repairs • A more detailed explanation of Clearwater's methodology for arriving at billable rates If updated countywide and maintenance agreements are not feasible at this time or will take an extended period of time to develop and execute, we recommend Transportation management work with Clearwater Traffic Operations in the interim to develop current standard operating guidelines governing the maintenance of all ATMS/ITS intersection components. These guidelines, at a minimum, should provide current maintenance standards, a comprehensive list of devices, and the agreed responsibility for maintenance and repairs.					
B	Re-emphasize the importance of coordination and collaboration with Clearwater Traffic Operations, including all critical operational, equipment replacement, maintenance, and implementation decisions and concerns, during the scheduled operational meetings. Transportation management should also consider working with Clearwater Traffic Operations to re-institute periodic management meetings to discuss big picture items affecting both agencies.	✓				
C	Ensure Clearwater removes the white enforcement light devices from all future invoices.	✓				

OFI NO.	PREVIOUS RECOMMENDATION	IMPLEMENTATION STATUS				
		Implemented	Acceptable Alternative	Partially Implemented	Not Implemented	No Longer Applicable
3	***The Cityworks Application Provided Insufficient Reporting Functionality.***					
A	Work with OAM and OTI to ensure all required custom reports are developed, tested, and implemented so management can effectively monitor PM, repair, and signal timing work. This includes OTI incorporating the functionality for Transportation staff to query the Cityworks database directly from Crystal Reports.	✓				
B	Work with OAM and OTI to create the necessary system fields to distinguish between the types of traffic signal timing work.	✓				
C	Ensure staff accurately records all PM, repair, and traffic signal timing work in Cityworks.	✓				
4	***Traffic Signal Preventive Maintenance Was Behind Schedule And Preventive Maintenance On Other Devices Was Inconsistently Recorded.***					
A	Develop a goal to catch up on traffic signal PM with the anticipation that staff currently involved in construction projects will be able to assume a greater role in PM responsibilities once those projects are complete.	✓				
B	Assuming it cannot adequately catch up on traffic signal PM, determine how many additional staff would be necessary to complete this effort and seek funding to fill the necessary position(s).					✓
C	Consistently record ITS PM in the quarterly performance measure reports so the information is available for comparison against the established performance goals.					✓
D	Amend the next Public Works Strategic Plan to reflect the two-year traffic signal PM goal.				✓	
5	***Intelligent Transportation System Installation Contractors Lacked The Required Technical Expertise.***					
A	Perform a cost-benefit analysis to hire and train additional staff to complete ITS equipment installation projects in-house instead of soliciting a contractor to potentially save money and	✓				

OFI NO.	PREVIOUS RECOMMENDATION	IMPLEMENTATION STATUS				
		Implemented	Acceptable Alternative	Partially Implemented	Not Implemented	No Longer Applicable
	ensure quality work completion. If this proves desirable, management should seek the funding to complete the process to hire ITS equipment installation staff.					
B	Create a quality assurance plan for the ITS installation projects, which should include specific inspection, measurement, and documentation requirements.		✓			
C	Explore the feasibility of hiring or reassigning existing staff to perform full-time ITS installation quality control inspections.	✓				
D	Assuming Transportation continues to solicit contractors to perform ITS project installation work, include specific technical skills commensurate with the ITS installation work in its scope of work so only capable contractors bid and receive awards.		✓			
6	***Transportation Engineering And Design Did Not Collaborate Effectively With Operations On Traffic Equipment Installation Decisions.***					
A	Obtain a list of specific equipment placement concerns from the Operations section and initiate a dialogue between the Traffic Systems Engineering and Design section and Operations section to resolve any concerns.	✓				
B	Re-emphasize communication efforts between the Traffic Systems Engineering and Design section and Operations section on the design and placement of traffic and ITS equipment at intersections. This could be accomplished through regular meetings between the two sections regarding ongoing and planned activities, as well as allowing Operations staff to test equipment placement in the field before design plans are finalized.	✓				
C	Incorporate a discussion of the necessary collaboration between the Traffic Systems Engineering and Design section and Operations section within its planned Transportation Design Manual.	✓				
7	***Municipalities Did Not Consistently Self Report Traffic Advisory Information.***					

OFI NO.	PREVIOUS RECOMMENDATION	IMPLEMENTATION STATUS				
		Implemented	Acceptable Alternative	Partially Implemented	Not Implemented	No Longer Applicable
A	Formulate a plan to coordinate with all capable County municipalities so they can begin entering their own traffic advisory data in ArcGIS. Transportation should continue to compile traffic advisories for municipalities that do not have access to ArcGIS.			✓		
B	Actively review municipality traffic advisory webpages for relevant advisories and update the TAR accordingly until the self-reporting of municipality traffic advisory data is achieved.		✓			
8	***The Traffic Management Webpage Was Outdated And Contained Insufficient Public Outreach Information.***					
A	Work with OTI and BTS to obtain approval to update the ATMS/ITS webpage to include, at a minimum, the following information: • Functionality of the ATMS/ITS and TMC • Relevant statistics on ITS devices and coverage of roadway corridors • Current status of the ATMS/ITS implementation • List of reportable citizen traffic concerns • Direct contact information for the TMC, including Transportation's Twitter account • Most recent traffic studies regarding adaptive signal control			✓		
B	In conjunction with the ATMS/ITS webpage update, implement the Smart Tracs ATIS webpage.				✓	
C	Complete a media campaign to inform the public once the new ATMS/ITS and ATIS webpages are implemented.				✓	
9	***Transportation Should Continue To Employ All Predictive Technology Resources For Traffic Management.***					
A	Assess and develop a list of its data needs in order to achieve its predictive technology goals in the Waycare application.	✓				

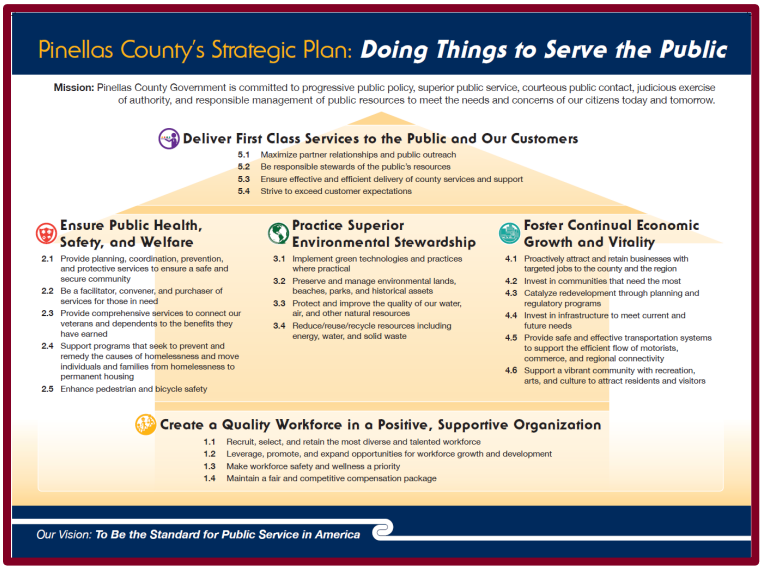
OFI NO.	PREVIOUS RECOMMENDATION	IMPLEMENTATION STATUS				
		Implemented	Acceptable Alternative	Partially Implemented	Not Implemented	No Longer Applicable
B	Engage other County, local, and state agencies, as applicable, to form partnerships and initiate data exchange through the Waycare application.	✓				
10	***Transportation Did Not Complete Its Roll-out Of Tablets And Associated Accessories To Field Staff.***					
A	Complete the roll-out of tablets to its field staff.	✓				
B	Survey staff on the preferred tablet cases and mounting devices and purchase these items for permanent installation on the assigned tablets and in the assigned work vehicles.	✓				
11	***Transportation Did Not Monitor Travel Time Performance On All Roadway Corridors With Monitoring Equipment.***					
A	Begin compiling monthly internal performance reports on all County operated roadway corridors equipped with BlueTOAD travel time monitoring equipment. This will provide a means of historical performance and future predictive analysis.	✓				
B	Make travel time performance reports available on the updated Transportation webpage so the public is aware of travel time performance and trends.				✓	
12	***The Traffic Management Center Doors Did Not Always Lock Automatically.***					
	Repair the TMC door so it automatically locks upon entrance and exit.	✓				

Background

Public Works manages essential vehicular, pedestrian, and drainage infrastructure, as well as critical natural and urban environmental resources for the County. The department consists of the following seven divisions:

- Transportation
- Stormwater and Vegetation
- Environmental Management
- Construction Management
- Survey and Mapping
- Technical Services
- Customer Service

The department strives to be responsive to citizens and work with them to provide services such as mowing, mosquito control, traffic control, sidewalk, road, and bridge maintenance, as well as develop and manage capital projects for the County.



Highlighting the importance of transportation systems, the County's Strategic Plan provided the following objective in Strategy 4.5:

> *"Provide safe and effective transportation systems to support the efficient flow of motorists, commerce, and regional connectivity."*

Based on the 2015 *Urban Mobility Scorecard* produced by the Texas A&M Transportation Institute, the average traveler in the Tampa Bay area was delayed by congestion approximately 41 hours per year, with a cost of $907 for lost time and excess fuel.

The fiscal year (FY) 2019 adopted budget listed the following accomplishment for Public Works:

> *"The department continues to reduce vehicular travel times and implemented three new major advanced traffic management installations, with three more currently under construction along major County roads."*

Transportation operates the Countywide ATMS/ITS through the County's state of the art TMC, also known as the Primary Control Center (PCC). Transportation also maintains traffic control devices for 16 municipalities, two fire districts, and the Florida Department of Transportation (FDOT) through inter-governmental agreements. Transportation is organizationally responsible for the following sections:

- Operations
- Planning
- Engineering
- Traffic Systems Engineering and Design
- Capital Planning and Right-of-way Management
- Traffic Maintenance
- Roadway Maintenance

Intelligent Transportation System

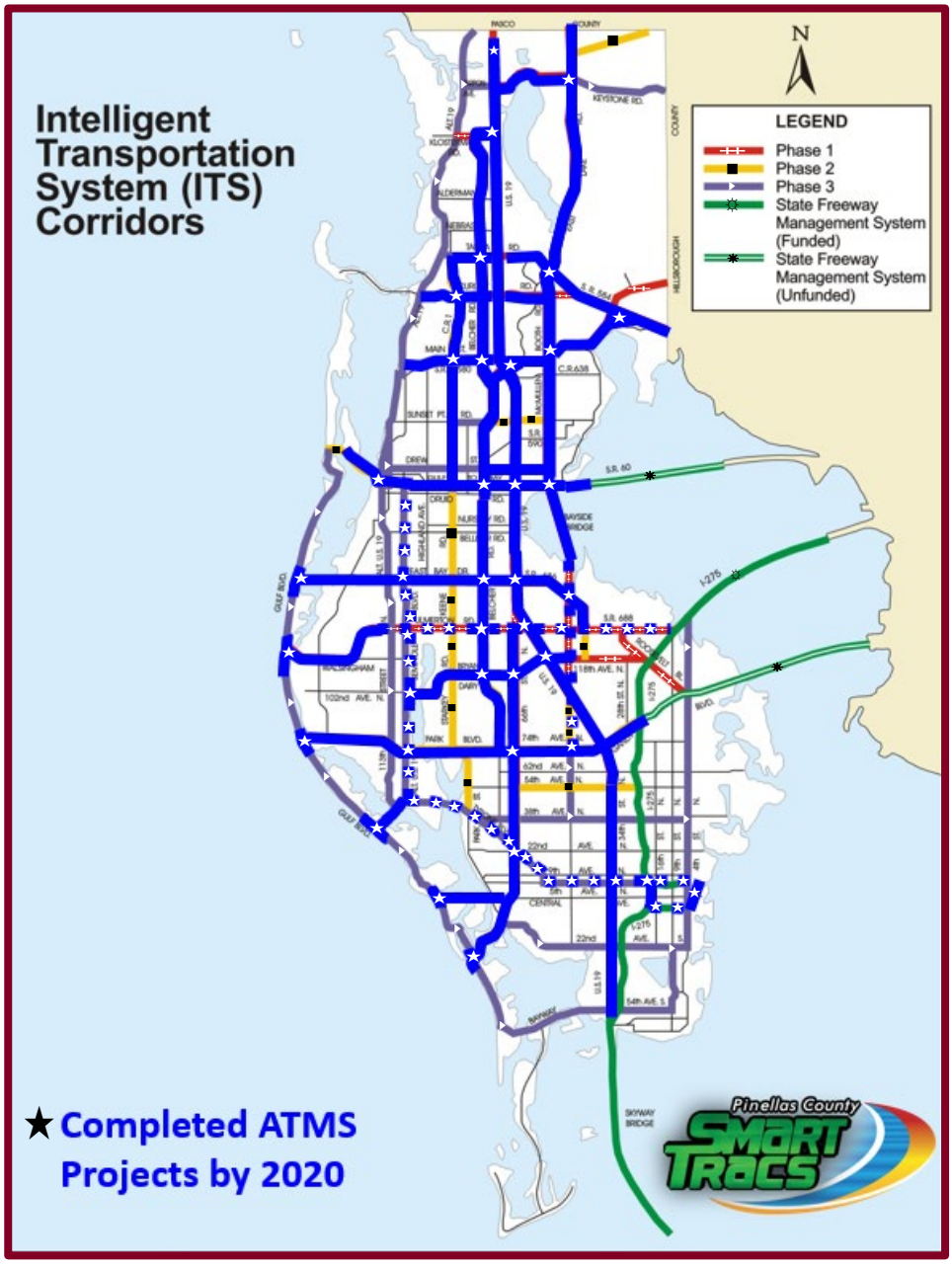
ITS is a term used throughout the United States and the world. Directive 2010/40/EU of the European Parliament and the Council of the European Union, made July 7, 2010, stated the following related to an ITS:

> *"Intelligent Transport Systems (ITS) are advanced applications which without embodying intelligence as such aim to provide innovative services relating to different modes of transport and traffic management and enable various users to be better informed and make safer, more coordinated and 'smarter' use of transport networks."*

Presently, the Public Works ITS includes 15 types of technology-based systems, divided into two focuses: intelligent infrastructure systems and intelligent vehicle systems. This broad range of wireless and wire-line communications-based traffic and traveler information systems are combined to help motorists make better decisions. When integrated into the transportation system infrastructure, and into vehicles themselves, these technologies help monitor and manage traffic, reduce congestion, provide alternative routes to travelers, enhance productivity,

improve pedestrian and vehicle safety, and increase the efficiency of the entire transportation network.

The County's ITS is known as Smart Tracs. Implementation of the County ITS infrastructure was divided in three phases on specific highway corridors in coordination with ongoing highway projects. As of audit fieldwork, Transportation had started Phase 3 while finishing remaining projects from Phase 2. Some of the necessary projects were not in the Capital Improvement Plan. Therefore, Transportation intended to submit applications for state funds through the County Incentive Grant Program and the Transportation Regional Incentive Program.



Over 200 miles of fiber optic backbone is in place to support the ITS. The backbone connects primary County facilities, the FDOT, and several municipalities. The ITS infrastructure relies on devices such as advanced vehicle detectors, closed-circuit television (CCTV) cameras, and dynamic message signs (DMSs). During audit fieldwork, we noted the County traffic network included a total of 171 CCTV cameras, 54 DMSs, and 435 signal devices.

Transportation's goal is to have a fully redundant traffic network that shares real-time information to facilitate the most efficient traffic movement possible. Transportation's efforts to complete the ITS and its dedication to stay on the cutting edge of technology have bolstered this endeavor.

Moving forward, the ITS will have the capability of interacting with intelligent vehicles as more vehicles are equipped with intelligent vehicle technology.

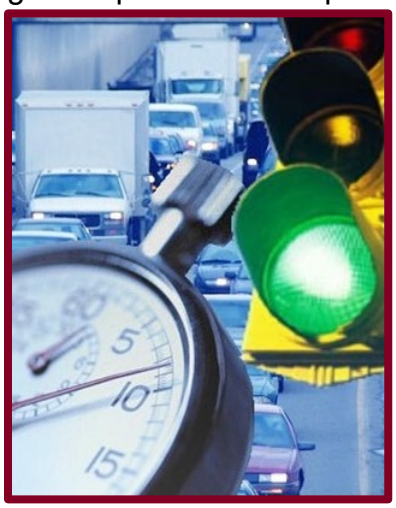
Advanced Traffic Management System

The ATMS integrates hardware, equipment, ITS technology, and other electronic communication systems, in an effort to operate the traffic signals more efficiently. Traffic is monitored, the timing of traffic signals is optimized on major County roads, and traffic flow is improved.

Transportation operates the TMC for the nationally recognized countywide ATMS. This control center is the hub for both ATMS and ITS related activities. All County maintained traffic signals, CCTV cameras, and DMSs relay information to the TMC to be used by operators to manage the roadway network. CCTV cameras are used for monitoring arterial roadways and intersections for traffic backups and verifying incidents or accidents. Traffic incidents are communicated with area emergency dispatch centers. DMSs communicate traveler information and travel time information.

Transportation is an innovator in the implementation of adaptive traffic control. The TMC Standard Operating Guidelines manual states the following regarding Transportation's adaptive control system:

> *"Pinellas County was recognized nationally by the Institute of Transportation Engineers (ITE) for the successful rollout of the first United States based computerized adaptive signal system."*



Unlike traditional timing plans, adaptive control evaluates the available time, uses detection devices to evaluate the traffic volume at the intersection, and uses an algorithm to allocate the available time in the most efficient manner. Transportation continues to test the feasibility and expand the use of adaptive traffic control on County roadways as it completes the ITS.

Advanced Traveler Information System

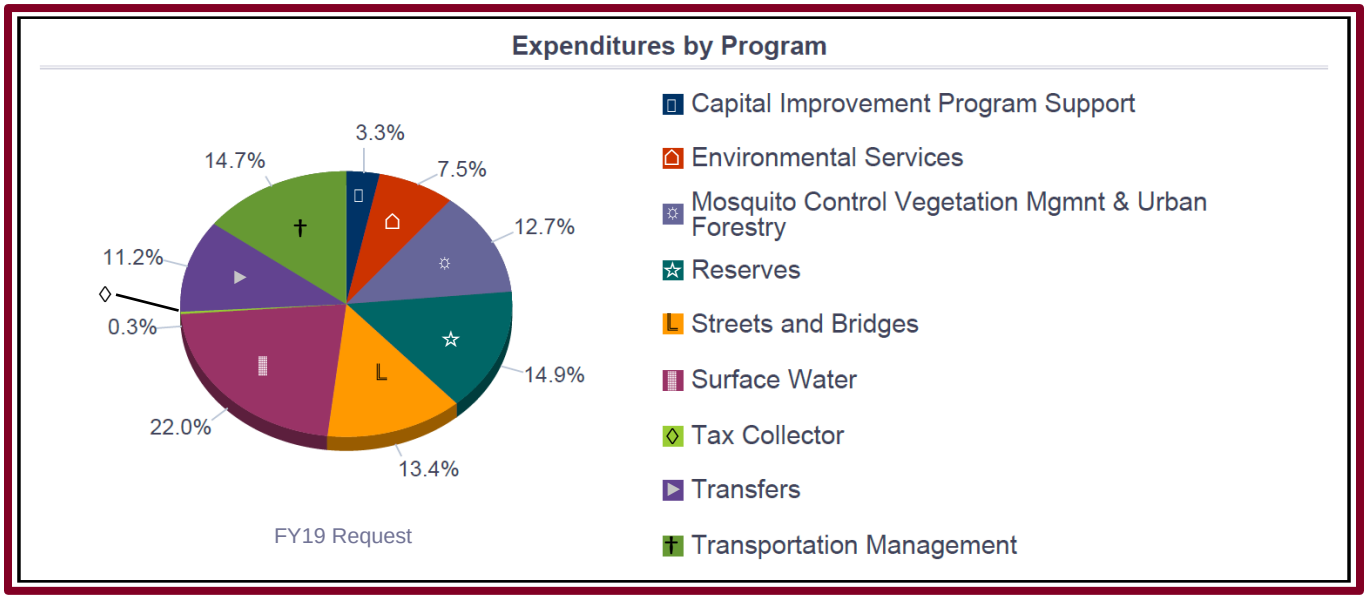
The County is currently testing an Advanced Traveler Information System (ATIS), which will provide motorists information about the roadway system to improve their daily trips and maximize the capacity of the network. The ATIS will provide access to travel time information and a traffic condition map containing the following layers:

- Weather information
- Traffic construction
- Traffic incidents
- Special events
- Traffic cameras
- Message signs
- Traffic speeds

Public Works currently performs public outreach on traffic incidents with its @pinellastraffic Twitter account. The Public Works website also provides traffic and roadway advisories.

Budget

The Transportation Management budget comprised 14.7% of the FY 2019 Public Works budget request and was the third largest Public Works program in terms of expenditures, as seen in the following chart.



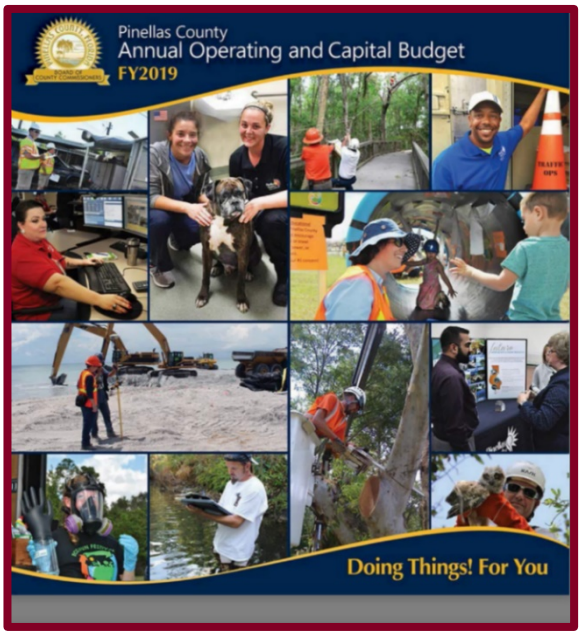
The following table depicts the expenditures by Public Works program for FYs 2017 through 2019:

Department Budget Summary			
Expenditures By Program			
Program	**FY 2017 Actual**	**FY 2018 Revised**	**FY 2019 Request**
Capital Improvement Program Support	2,676,196	2,907,320	3,555,730
Environmental Services	7,136,389	8,200,670	8,194,480
Mosquito Control Vegetation Management and Urban Forestry	9,594,498	13,353,650	13,872,360
Reserves	-	36,123,060	16,280,810
Streets and Bridges	9,411,470	11,098,470	14,571,590
Surface Water	17,438,535	23,153,190	23,958,640
Tax Collector	284,678	293,050	295,800
Transfers	1,598,610	1,700,000	12,250,000
Transportation Management	10,602,431	12,648,450	15,992,210
Total Expenditures	**$58,742,807**	**$109,477,860**	**$108,971,620**

The Transportation Management expenditures increased by 19.3% from FY 2017 to FY 2018 and by 26.4% from FY 2018 to FY 2019.

A breakdown of the total expenditures by fund for FYs 2017 through 2019 is provided in the following table:

Transportation Management Budget Summary By Fund			
Expenditures By Fund			
Fund	**FY 2017 Actual**	**FY 2018 Revised**	**FY 2019 Request**
County Transportation Trust	10,602,431	12,648,450	15,991,680
General Fund	-	-	530
Total Expenditures by Program	**$10,602,431**	**$12,648,450**	**$15,992,210**



The County Transportation Trust holds the County's fuel tax revenue. Florida allows the County to levy up to 12 cents of local option fuel taxes. The County levies 7 cents of the 12 cents available. Of that amount, the County allocates one cent dedicated for use by the ATMS/ITS. The remainder of the fuel tax revenue may be used for roadway operations and maintenance, which includes roads, bridges, sidewalks, curbs, street gutters, etc.

Transportation management stated it earmarked surplus funds in the County Transportation Trust fund for immediate need projects during this budget cycle, which resulted in the increased expenditures noted in the preceding tables. For example, the ATMS/ITS central traffic control software will be replaced. In addition, Transportation is using the surplus funds to repair potholes and perform other needed roadway repairs in response to numerous reports from citizens. Management stated expenditures should decrease to normal operating levels after the completion of these projects.

Due to fleet changes (e.g., electric, hybrid, and fuel efficient vehicles) and pressure from other transportation needs to use existing gas tax revenues, available gas tax funding is projected to grow at a slower pace than Public Works operations and maintenance expenses. Therefore, the County is seeking alternate funding methods due to a forecasted $4.1 million annual deficit by FY 2024.

Accomplishments

During the June 5, 2018, BCC meeting, Public Works received the American Public Works Association (APWA) West Coast Chapter Management Innovation Award and Tampa Bay Regional Planning Council Community Preparedness Award for developing a mechanism to power traffic signals using an inverter connected to a vehicle. This award acknowledged Transportation staff's innovative response to the loss of traffic signal power throughout the County in the aftermath of Hurricane Irma.

The APWA also presented Public Works with its prestigious accreditation designation at the BCC meeting on August 7, 2018. APWA accreditation provides formal recognition Public Works complies with national standards in the APWA Public Works Management Practices manual and has performed an in-depth self-assessment of its policies, procedures, and practices. As of its accreditation date, Public Works was only the 12th agency in Florida and 140th in North America to achieve the status.

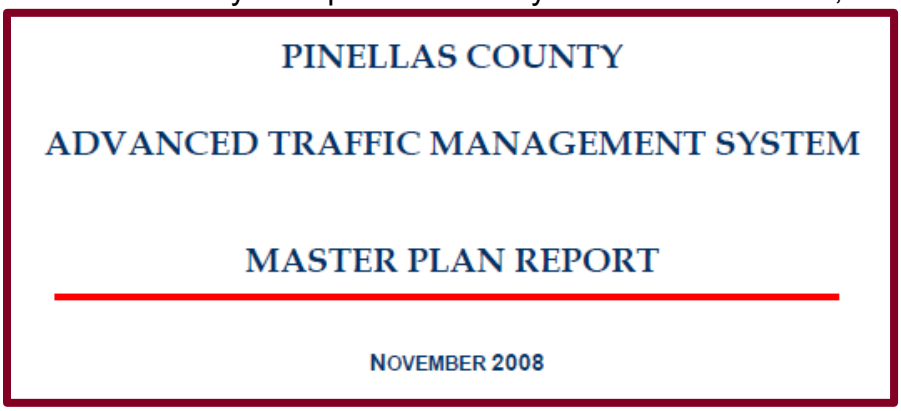
Beyond the APWA accomplishments, Transportation has received six awards for the different elements of the ATMS/ITS and an additional two awards for the power inverter solution.

STATUS OF RECOMMENDATIONS

This section reports our audit follow-up on actions taken by management on the recommendations for improvement in our original audit report of the Traffic Management System Coordination. The recommendations contained herein are those of the original audit report, followed by the current status of the recommendations.

1. The Advanced Traffic Management System Master Plan Was Outdated.

The ATMS Master Plan was created in November 2008 and is now over 10 years old. Gord & Associates, Inc. performed the study for the FDOT to define the Master Plan for the development and deployment of ATMS solutions in the County. The plan had a 10-year focus. Therefore, it is now outdated.


PINELLAS COUNTY

ADVANCED TRAFFIC MANAGEMENT SYSTEM

MASTER PLAN REPORT

NOVEMBER 2008

The Master Plan included multiple recommendations to guide Transportation in its implementation efforts. We reviewed those recommendations and determined several were addressed. The following five efforts were still in progress:

- Centralized traffic system access in the PCC
- Installation of uninterruptible power supplies (UPSs) on all traffic cabinets
- Vehicle detection technology
- Implementation of highway advisory radio (HAR)
- Emergency vehicle preemption technology

Transportation management stated it was in the solicitation process for a new central traffic control software. This software will integrate multiple PCC applications and provide centralized access.

Transportation was also in the process of completing UPS device installation in all traffic cabinets with a goal of initiating communication between the traffic control software and the UPS devices to detect power outages. This would assist TMC staff in detecting, reporting, and monitoring power outages and UPS battery life. Transportation has made significant progress on the UPS installation with 267 UPSs installed throughout the County, which covers all signalized

intersections on critical roadway corridors, evacuation routes, and traffic signals with high pedestrian volumes.

Transportation management acknowledged it needed a more advanced vehicle detection technology. However, it had encountered issues with wireless technology. Therefore, Transportation needed to test other available methods to arrive at the best solution. Transportation also put the HAR implementation on hold until a final decision could be made concerning its efficacy.

During audit fieldwork, a consensus among Transportation staff was the current emergency vehicle preemption system was inefficient and created the opportunity for abuse by placing control with the vehicle operators. We visited multiple fire departments to review their emergency vehicle preemption procedures. Although we identified no specific instances of abuse, fire department staff also expressed concerns about the efficiency of the existing system.

Transportation had a goal of upgrading the emergency vehicle preemption technology, but funding constraints needed to be addressed prior to moving forward with a solution. Transportation management provided examples of available preemption technology, such as route-based signal control and satellite-based preemption, but it noted those technologies were cost prohibitive. We contacted Safety and Emergency Services management to discuss the matter, and it expressed a willingness to assist Transportation with funding efforts in an attempt to make the existing emergency vehicle preemption system more efficient. Subsequent to the discussion, Transportation management demonstrated to Safety and Emergency Services management a route-based signal control solution used in another state.

Transportation should have current planning documentation on file to ensure it remains focused on its long-term objectives related to the development and deployment of the ATMS/ITS. The planning documentation should include goals to improve the efficiency and effectiveness of operations on a continuous basis by leveraging the most current technology available.

The Government Finance Officers Association (GFOA) provides best practices for Master Plans and capital improvement planning. The GFOA defines the background of Master Plans and capital improvement planning and provides recommendations as follows:

> *"Many governments establish long-range strategies focused on community development and sustainability through the use of Master Plans. As blueprints for the future, these plans identify economic, land use, and infrastructure development and/or redevelopment, which may include transportation, housing, and public facilities. Master Plans, most frequently coordinated by the local government's*

planning department with broad community participation, identify jurisdictional needs ten to twenty-five years into the future. Regular updates to these plans are imperative to ascertain development or infrastructure needs as local conditions change.

Master Plans are the foundation for:

- *the development of physical plans for sub-areas of the jurisdiction;*
- *the study of subdivision regulations, zoning standards and maps;*
- *the location and design of thoroughfares and other major transportation facilities;*
- *the identification of areas in need of utility development or extensions;*
- *the acquisition and development of community facility sites;*
- *the acquisition and protection of open space;*
- *the identification of economic development areas;*
- *the incorporation of environmental conservation;*
- *the evaluation of short-range plans (zoning requests, subdivision review, site plan analysis) and day-today decisions with regard to long-range jurisdictional benefit; and*
- *the alignment of local jurisdictional plans with regional plans.*

In addition to a long-range Master Plan, governments utilize Capital Improvement Plans (CIP) to identify present and future needs requiring capital infrastructure. Such plans operate for a shorter duration, often three-to-five years, and list the projects and capital programs planned for the community with corresponding revenues and financing sources. Paying attention to financial factors during the development of master plans allows for a smoother transition of long-range plans to implementation and lessens the impact on the CIP and future operating budgets. Subsequently, to adequately guide the fiscal, operating, and land use needs of the community, finance officers should use Master Plans as a framework for capital project requests that go into the CIP.

GFOA recognizes the role of Master Plans as one of the CIP's important elements and recommends that governments consider the following:

1. ***Master Plans should provide a vision for capital project plans and investments.*** *Master Plans provide a vision for the government that should be supported by realistic planning documents, solid financial policies targeted for the implementation of stated goals, and trends on the government's accomplishments and progress toward these goals. Such plans forecast the outlook for the government, illustrating the [alignment] between demand generators, capital improvement programs, and funding policies. In doing so, Master Plans help address the management factors that are critical in rating analysis and investor communication.*

2. ***Governments should make capital project investment decisions that are aligned to their long-range Master Plans.*** *The list of potential projects for inclusion in the CIP comes from a variety of sources, including department requests, plans for facility construction and renovations, long-term capital replacement programs, citizen requests, neighborhood plans and projects for which grant funds are available. These projects should always be reviewed for consistency with the government's Master Plan(s). The CIP should be viewed as a financial blueprint that helps prioritize needs to achieve implementation of the public improvements identified in the Master Plan. The level of funding in the CIP defines the financial capacity to reach the desired goals set forth in the Master Plan.*

3. ***The finance officer should play an active role in the early planning process.*** *Master Plans can be useful for projecting long-range service demand generators, facility capacity needs, and stakeholder communication. Knowledge of facility capacity needs coupled with financial policies and revenue comparisons allows for the development of a more fiscally prudent Master Plan. It is important that Master Plans strike a balance between stakeholder vision and the government's financial capacity in order to reach the desired goals. This balance can be accomplished by considering financial implications during the development phase of a Master Plan.*

4. ***Financial factors should be considered as part of the development of Master Plans.*** *The master planning process should be an in-depth analysis, incorporating the financial factors that bridge the gap between planners and finance officials. When integrating plans with financial policies, governments should consider both the costs and revenue streams. Possible revenue streams include bond programs, pay as you go alternatives, grants, impact fees, and public private partnership alternatives. Reviewing the revenue generating potential under the plan assumptions will help identify the capability to finance needed capital projects as well as any gaps in the ability to do so. Moreover, the plan's vision should be balanced between the financial capacities to meet the stated goals, or at a minimum, should clearly identify the financial implications of a vision that may conflict with the jurisdiction's financial policies and capacity. Planning documents should incorporate scenario testing during development and the jurisdiction should, at a minimum, understand the plan cost drivers, alternative scenario outcomes (from both a need and revenue generating potential) and options for meeting the desired goals."*

Transportation management indicated it was aware the ATMS Master Plan was outdated and needed revision. Transportation began updating the ATMS Master Plan in 2015 and had it in draft form. Upon discussions between management and a consultant, however, management realized it needed much more information to update the plan. The document has been on hold since that time with ongoing ATMS/ITS projects demanding staff resources.

Many technological changes have occurred in traffic management over the last 10 years. Technologies prevalent at the time of the ATMS Master Plan creation in 2008 may no longer be viable or may have been superseded by other technologies. With outdated planning documentation in place, Transportation risks losing track of its long-term goals and becoming stagnant in its technology. This could reduce the effectiveness and efficiency of the transportation management system.

We Recommended Management:

A. Complete an updated ATMS Master Plan. The updated plan should include the current status of the ATMS/ITS implementation and the future goals of the traffic management system, including the associated costs to achieve those goals. The ATMS Master Plan should be reviewed and updated periodically as recommended by best practices.

B. Complete efforts to address the remaining recommendations from the 2008 ATMS Master Plan as follows:

- Complete the selection and implementation of the new central traffic control software
- Complete installation of UPS equipment and backup batteries on all traffic cabinets and initiate communication between the UPS equipment and the traffic control software
- Select, purchase, and install the optimal vehicle detection technology
- Perform an analysis and make a decision on the implementation of HAR
- Seek the required funding, collaborating with Safety and Emergency Services where feasible, to purchase and upgrade the emergency vehicle preemption technology

Status:

A. **Partially Implemented.** Transportation began working with a consultant, VIBEngineering, Inc., to draft and finalize an ITS Implementation Plan, which will build upon and supersede both the 2008 ATMS Master Plan and 2009 ITS/ATMS Implementation Plan. The consultant is using an ATMS/ITS Implementation Plan Update Scope of Work document to draft the 2021 ITS Implementation Plan. According to the Scope of Work, the status of the County's ITS program and the course the County will take to adapt to future technology and system improvements will be included in the 2021 ITS Implementation Plan. The plan in currently in the draft phase. Until the 2021 ITS Implementation Plan is finalized, Transportation risks losing track of its long-term goals and becoming stagnant in its technology. A reduction in the effectiveness and efficiency of the County's transportation management system could happen as a result. We continue to encourage management to fully implement the recommendation.

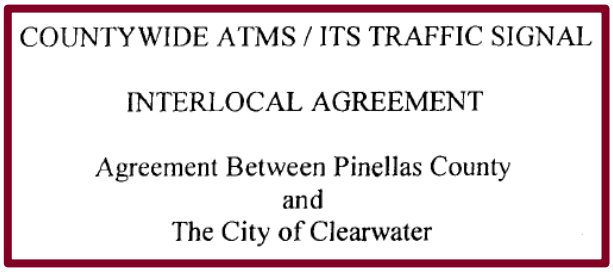
B. **Partially Implemented.** Transportation has made tremendous progress in completing all of the elements of this recommendation. Transportation has several initiatives ongoing, which include fully installing and implementing the new central traffic control software, deploying UPSs at the remaining County signalized intersections, selecting and

implementing a vehicle detection technology from the tested technologies, and continuing to collaborate and seek funding to upgrade the emergency vehicle preemption technology. Transportation determined HAR is outdated technology and intends to use more modern technology to perform public outreach for traffic incidents. The risk of Transportation being less efficient at managing the County's traffic control devices will continue to exist until completion of the ongoing initiatives. We continue to encourage management to fully implement the recommendation.

2. The Transportation Countywide And Maintenance Interlocal Agreements With Clearwater Contained Outdated And Unclear Information.

Our review of the Countywide ATMS/ITS Traffic Signal Interlocal Agreement (countywide agreement) and the Interlocal Agreement for Maintenance of Traffic Control Signals and Devices (maintenance agreement) revealed both agreements contained outdated information. Moreover, insufficient clarity in the maintenance agreement contributed to disagreements regarding the responsibility for maintenance on certain devices.

Transportation entered into the countywide agreement with Clearwater on May 18, 2006. The original agreement had a 10-year term that expired May 18, 2016. Transportation entered into the maintenance agreement with Clearwater on April 4, 2007. The maintenance agreement contained a renewal clause that kept it in effect as long as the countywide agreement was active.


COUNTYWIDE ATMS / ITS TRAFFIC SIGNAL

INTERLOCAL AGREEMENT

Agreement Between Pinellas County
and
The City of Clearwater

On March 23, 2016, Transportation and Clearwater executed an amendment to the countywide agreement. The purpose of the amendment was to extend the countywide agreement for 10 years until May 18, 2026, without substantially changing the language in the original agreement. With the extension of the countywide agreement, the maintenance agreement was extended automatically.


INTERLOCAL AGREEMENT FOR
MAINTENANCE OF TRAFFIC CONTROL SIGNALS AND DEVICES

THIS AGREEMENT, entered into on the 4th day of April 20 07, between the BOARD OF COUNTY COMMISSIONERS of Pinellas County, a political subdivision of the State of Florida, hereinafter referred to as the COUNTY, and the CITY OF CLEARWATER, a municipal corporation of the State of Florida, hereinafter called the CITY.

Transportation operates all traffic signals on ATMS/ITS corridors and FDOT corridors within the city limits of Clearwater. The impetus of the original maintenance agreement was for Clearwater to retain maintenance responsibilities on all of its traffic signals. Consequently, the maintenance

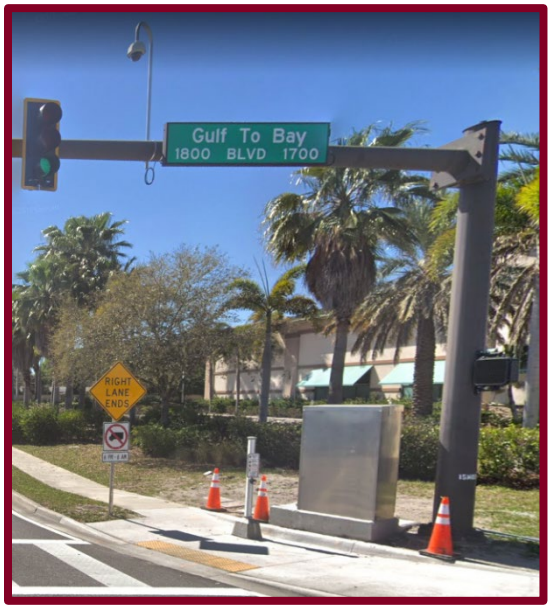
agreement required Transportation to compensate Clearwater for maintenance performed on traffic signals on the ATMS/ITS corridors and FDOT corridors within city limits. To offset these maintenance costs, Transportation used funding received from the local option gas tax and the FDOT.

We reviewed the countywide agreement and maintenance agreement to determine if both documents contained relevant and complete information necessary to ensure the effective maintenance of ATMS/ITS devices in Clearwater. As a result, we identified the following outdated information in the countywide agreement:

- ATMS/ITS project phase
- PCC Committee composition and meeting frequency
- Maintenance standards and guidelines

The countywide agreement referred to the PCC Committee staffing in Phase 1 of the ATMS/ITS implementation. However, it did not address the method of communication and coordination between Transportation and Clearwater during the advanced stages of the project. Moreover, Transportation is currently in Phase 3 of the ATMS/ITS implementation. The countywide agreement stated the PCC Committee would meet on a regular basis, yet Transportation management said the last meeting was several years ago. In addition, Clearwater did not appoint a City Representative at Transportation despite this position being listed in the agreement. Management stated Transportation implemented scheduled monthly operational meetings with Clearwater several years ago. However, it is the management meetings that have not occurred routinely.

We witnessed an instance of insufficient communication between Transportation and Clearwater during field observations with Transportation staff. Clearwater replaced a traffic cabinet without consulting Transportation on the decision. Although Clearwater purchased the equipment, Transportation was responsible for the operation of the traffic cabinet components. Transportation staff indicated it attempted to determine why Clearwater replaced the traffic cabinet. However, no one from Clearwater responded. This further highlighted the necessity of a consistent means of collaboration between the two agencies.



Maintenance standards and guidelines in the original countywide agreement are now over 13 years old. Numerous technological advances have occurred in the interim, and Transportation has revised its maintenance standards accordingly.

Our review identified the following issues with the maintenance agreement:

- Insufficient delineation between Transportation and Clearwater maintenance responsibilities on specific types of equipment
- Unclear rate determination methodology
- Outdated billable device listing

The countywide agreement stated the following regarding the maintenance of ITS devices:

> *"Pinellas County will be responsible for maintaining all ITS devices once they have been installed."*

The maintenance agreement stated the following:

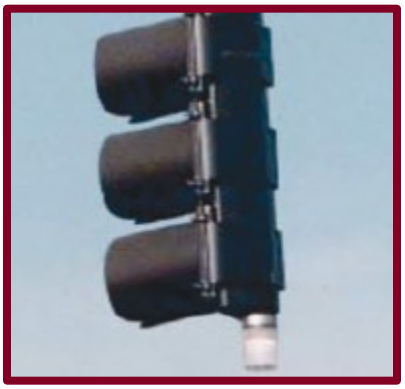
> *"The CITY shall provide all maintenance services for traffic control signals and devices situated within the corporate limits of the CITY located on ITS corridors established under the ATMS/ITS Interlocal Agreement."*

The maintenance agreement provided no specific guidance on the responsibility for ITS device maintenance. Transportation management indicated Clearwater interpreted the agreements to require Transportation to perform all ITS device maintenance, whereas Clearwater would maintain the traffic signals and devices that connected to them. For example, CCTV cameras are independent devices intended to monitor traffic flow and are not connected to the traffic signals. On the other hand, detection cameras are ITS devices that connect to the traffic signal controller.

Depending on the type of device, there were disagreements between Transportation and Clearwater on who had the responsibility for maintenance or repair. Ultimately, the County performed the maintenance or repair work if Clearwater did not do so. In the absence of an updated agreement, Transportation management said it would like to see standard operating guidelines that clearly define the responsibilities of Transportation and Clearwater.

In addition, the maintenance agreement provided very little information on Clearwater's rate determination methodology. The agreement provided rates for the initial maintenance year and stated there would be annual increases based on the consumer price index. However, Transportation management stated Clearwater waived increases in some years. It is also unclear if Clearwater based its maintenance costs on actual expenses or if it used an alternate methodology.

Appendix A and B of the original maintenance agreement listed red light running devices as billable equipment. We reviewed the FY 2019 Clearwater maintenance invoice and determined Transportation paid Clearwater $295 each for maintenance on four red light running devices, for a total of $1,180. Upon further inquiry, Transportation management stated those were white enforcement lights installed at intersections. The intent of a white enforcement light is to notify enforcement officers located downstream from an intersection when a motorist traveling upstream runs the red light. Transportation management confirmed there was not a large amount of maintenance involved in the white enforcement lights. In addition, Transportation did not bill other municipalities for such maintenance. After we questioned Transportation management about the devices, it discussed the matter with Clearwater Traffic Operations and obtained confirmation Clearwater would remove the devices from future billable device listings.



Discussions with Transportation management revealed it requested the creation of a new maintenance agreement. However, Clearwater only agreed to an extension of the countywide agreement.

The ATMS/ITS is a dynamic and technology driven system, which places greater impetus on creating and retaining updated agreements. The updated agreements should reflect current maintenance standards, system breadth and associated technology, clearly delineated responsibilities, avenues of communication between Transportation and Clearwater, and transparent and accurate billing information.

Transportation and Clearwater should establish and maintain open communication on critical operational, equipment replacement, maintenance, and implementation decisions. This will ensure the efficiency and effectiveness of the traffic management system in Clearwater.

The International Business Machines Center for the Business of Government published a report in 2013 entitled *A County Manager's Guide to Shared Services in Local Government*. This report provided recommendations from experienced county officials to make shared service projects successful and noted the following requirements for success:

> *"Three key preconditions were found to mark the success of a shared service delivery venture:*
>
> - ***Leadership:*** *Support from top administrators and elected officials is necessary to advance dialogue and ensure the success of shared services and interlocal agreements. Teams or task forces of participants from multiple governments may identify opportunities for cooperation and maintain momentum.*
> - ***Trust and reciprocity:*** *Counties that develop a track record of cooperation with their neighbors develop trust, an asset for building new shared service efforts.*

- ***Clear goals and measurable results:*** *Specific goals for shared service projects can ensure success while confirming that the effort is worthwhile. Officials should regularly assess the services delivered through cooperation, as well as the quality of the working relationship."*

The report provided the following recommendations, among others:

> *"**Create a shared services assessment team.** Bring the right participants together to discuss shared services in a transparent manner. Maintain communication with partners over time, resisting the urge to set relationships on autopilot.*
>
> ***Identify strengths in participating governments.** Counties should carefully identify their areas of strength in determining where they could provide service to others, while also assessing other governments' areas of strength.*
>
> ***Discuss and document responsibilities with partners**… guiding cooperation with clear, documented terms written in a way that current and future county leaders will understand. Managers and policy-makers should regularly review and discuss shared service agreements.*
>
> ***Make appropriate changes as needed.** Public needs and budgets change over time."*

Transportation and Clearwater did not create new agreements providing the required information to identify and execute current roles related to the ATMS/ITS system in Clearwater. The initial agreements were extended for a period of 10 years with no modifications to the outdated agreement content.

An outdated countywide agreement and maintenance agreement resulted in misunderstanding between Transportation and Clearwater on responsibilities and coordination efforts. Transportation management noted disagreements on responsibility resulted in instances of back and forth between Transportation and Clearwater and inefficient response to maintenance and repair requests.

Despite the countywide agreement providing a framework to facilitate coordination between Transportation and Clearwater in the form of the PCC Advisory Committee, it rarely met. This further stifled communication between the two parties and led to decisions affecting both parties being made independently. Arbitrary equipment changes by Clearwater could result in operational issues for Transportation, although we noted no such issues during our review.

In addition, by not updating the agreement to ensure the billable devices were current, Transportation missed an opportunity to cease paying white enforcement light maintenance costs of $1,180 per year.

We Recommended Management:

A. Work with Clearwater Traffic Operations to explore the feasibility of updating the Countywide ATMS/ITS Traffic Signal Interlocal Agreement and the Interlocal Agreement for Maintenance of Traffic Control Signals and Devices to bring both agreements current. The agreements, at a minimum, should provide information and guidance on the following topics, as applicable:

- Status of the overall ATMS/ITS system implementation
- PCC Advisory Committee, or similar, and associated position composition and responsibilities
- Current maintenance standards
- A comprehensive list of maintained devices along with associated agreed responsibility for maintenance and repairs
- A more detailed explanation of Clearwater's methodology for arriving at billable rates

If updated countywide and maintenance agreements are not feasible at this time or will take an extended period of time to develop and execute, we recommend Transportation management work with Clearwater Traffic Operations in the interim to develop current standard operating guidelines governing the maintenance of all ATMS/ITS intersection components. These guidelines, at a minimum, should provide current maintenance standards, a comprehensive list of devices, and the agreed responsibility for maintenance and repairs.

B. Re-emphasize the importance of coordination and collaboration with Clearwater Traffic Operations, including all critical operational, equipment replacement, maintenance, and implementation decisions and concerns, during the scheduled operational meetings. Transportation management should also consider working with Clearwater Traffic Operations to re-institute periodic management meetings to discuss big picture items affecting both agencies.

C. Ensure Clearwater removes the white enforcement light devices from all future invoices.

Status:

A. **Partially Implemented.** Management and the City of Clearwater drafted a Standard Operating Guidelines (SOG) document to supersede the Countywide ATMS/ITS Traffic Signal Interlocal Agreement and the Interlocal Agreement for Maintenance of Traffic Control Signals and Devices. Management and Clearwater Traffic Operations recognized the necessity for the development of an SOG because the document would help resolve interaction issues between both agencies. The SOG is meant to clarify misinterpreted sections of both agreements and address issues that both agreements do not address. Both traffic agencies experienced recent leadership changes and are making a concerted effort to maintain a cooperative relationship in the interim. The SOG document is still in

draft form awaiting review by the new Clearwater Traffic Operations Manager. The opportunity for misunderstandings concerning responsibilities and coordination efforts between management and the Clearwater Traffic Operations still exists until the SOG is finalized. We encourage management to fully implement the recommendation.

B. **Implemented.** Transportation management continues meeting monthly with Clearwater Traffic Operations management to discuss ITS projects, operational and technical challenges, and seasonal conditions in order to further enhance the coordination between the agencies and the operation of the ITS/ATMS system and network. The meetings are virtual using Microsoft Teams and now include the senior staff of both agencies. The attendance of senior staff in the monthly meetings allows decisions to be made at that time.

C. **Implemented.** A review of the FY 2020 Clearwater maintenance invoice confirmed Clearwater is no longer billing the County for white enforcement light devices.

3. The Cityworks Application Provided Insufficient Reporting Functionality.

During audit fieldwork, we determined the Cityworks application had insufficient functionality to facilitate Transportation's reporting needs. Discussions with Transportation management responsible for PM of traffic signals, ITS device PM, repairs, and traffic signal timing all revealed concerns about the lack of reporting functionality in Cityworks. Management stated it was promised the reporting feature during software development, yet reporting was not delivered at implementation.

The County executed a contract with Woolpert, Inc. (Woolpert) on June 21, 2016, to implement Cityworks as its enterprise asset management application. The contract included multiple County departments and divisions, including Public Works Transportation. The County subsequently executed an amendment to the contract on February 5, 2019, which increased the not-to-exceed amount from $6,547,552 to $11,102,525 and modified the implementation tracks and phases.

Both the original contract and amendment included reporting among the software deliverables. The amendment price proposal included a cost of $116,993 for the planning and development of Public Works custom reporting and metrics. This total was not itemized by division, and the contract indicated Woolpert would create as many reports as possible given the amount of available funding. Woolpert required the County to provide a prioritized list of existing and desired reports to be developed. According to the amended project schedule, all reporting was to be finished and accepted by April 4, 2019, which was prior to system deployment.

Discussions with management in the Office of Asset Management (OAM) and the Cityworks Core Team Member for Public Works, revealed the funding for Woolpert custom reporting was exhausted on higher priority reports for competing departments and divisions. Woolpert and OTI were addressing the remaining Transportation custom reporting needs, and many of the reports were in development or testing. OAM management expressed its commitment to ensuring Transportation had all of its reporting needs met.

OTI was working to allow Transportation the ability to report directly from the Cityworks database using Crystal Reports. In the meantime, the Core Team Member created saved queries for Transportation staff to extract the data necessary for its quarterly key performance indicator report. Saved queries provide access to summary level data, which limits the ability to obtain detailed information.

Regarding traffic signal timing, management expressed a concern about Cityworks not allowing a distinction between small timing adjustments resulting from citizen complaints versus large-scale signal timing evaluations. Management only focused on the large-scale signal timing evaluations for reporting purposes. Therefore, it expressed concerns about being able to produce accurate reports based on the available data.

We also noted Transportation staff did not record ITS PM data and traffic signal timing data in the legacy Agile application and instead relied on paper records. Staff has since begun recording all PM activities in the Cityworks application. Our review of repair data recorded in Agile revealed instances where staff inconsistently recorded call receipt and crew arrival times, which compromised the data reliability.

The publication entitled *Performance Management Framework for State and Local Government: From Measurement and Reporting to Management and Improving*, produced by the National Performance Management Advisory Commission, stated the following regarding the importance of performance management:

> *"Governments want better information and practices that will help them improve results. This means providing better ways to:*
>
> - *understand public needs;*
> - *identify and implement programs and services that will meet those needs;*
> - *assure that policies, strategies, and services are in alignment;*
> - *collect and analyze performance information;*
> - *apply information to continuously improve results and become more efficient;*
> - *use data more effectively to inform policy decisions;*

- *support accountability, both within the organization and to the public;*
- *provide understandable information on performance to the public; and*
- *encourage citizens to provide feedback and get involved in the government's decision-making processes."*

This publication provided the following additional information regarding the importance of measurement and reporting:

> *"Planning, budgeting, management, and evaluation rely on two cross-cutting practices that are essential to all organizations engaged in performance management:*
>
> - *Measurement. Practices used to develop, collect, store, analyze, and understand performance, including indicators of workload or activity, effectiveness, efficiency, and actual results or improvements.*
> - *Reporting. Practices used to communicate performance measurement information to audiences including internal staff such as employees, management, and executives, along with elected officials, other organizations such as community interest groups and rating agencies, and the public."*

The original Cityworks implementation contract and amendment each noted reporting as a deliverable. The amendment stated the following in its Statement of Work:

> *"Custom reports and dashboard requirements will be defined and refined throughout the Advanced Configuration phase. Woolpert will develop report specifications based on information previously gathered and develop saved searches, dashboards, inboxes and custom reports as required to meet the County users' requirements."*

After the County and Woolpert developed a prioritized list of existing and desired reports, the following was to occur:

> *"Woolpert will develop specifications for as many of the identified reports as possible in their order of priority within the allocated time and budget. Woolpert will facilitate an on-site review of the report specification document with each Department before finalizing the specifications and commencing report development."*

Upon implementation of Cityworks on June 18, 2019, the software implementation vendor, Woolpert, did not provide the required reporting functionality for Transportation due to competing divisions' reporting needs taking priority.

In addition, the quantity of ITS equipment has grown significantly in recent years. Maintenance management had the goal of automating ITS PM work orders, but a decision was made to delay

ITS PM electronic recording until the implementation of Cityworks so staff would not have to learn two different applications. Operations management stated its lack of confidence in Cityworks reporting led to the decision to continue maintaining paper records for traffic signal timing.

On a quarterly basis, management must provide statistics for inclusion in a report of key performance indicators. Our discussions with Transportation management revealed it initially was unable to produce the required statistical data on PM for the last quarter of FY 2019 due to the Cityworks reporting constraints. Although the Core Team Member created a workaround to produce the required summary level data, Transportation management still lacked the ability to produce detailed reports. Moreover, the lack of available reporting limits the ability of management to periodically assess the progress of PM, repair, and traffic signal timing against the established goals.

We Recommended Management:

A. Work with OAM and OTI to ensure all required custom reports are developed, tested, and implemented so management can effectively monitor PM, repair, and signal timing work. This includes OTI incorporating the functionality for Transportation staff to query the Cityworks database directly from Crystal Reports.

B. Work with OAM and OTI to create the necessary system fields to distinguish between the types of traffic signal timing work.

C. Ensure staff accurately records all PM, repair, and traffic signal timing work in Cityworks.

Status:

A. **Implemented.** Management implemented all required custom reports. In addition, staff can query data directly from Cityworks.

B. **Implemented.** The Cityworks application now has a traffic signal timing template providing the ability to distinguish between the types of traffic signal timing work.

C. **Implemented.** Transportation management is ensuring new and existing staff are trained on recording information correctly in Cityworks and created an Enterprise Asset Management New Hire Learning Plan to ensure understanding and proficiency in Cityworks. In addition, management regularly reviews the data in the system for errors to be corrected.

4. Traffic Signal Preventive Maintenance Was Behind Schedule And Preventive Maintenance On Other Devices Was Inconsistently Recorded.

During our review of Transportation's performance measures for PM completion, we determined Transportation was behind schedule on traffic signal PM in FY 2018 and during the three quarters of available data in FY 2019. We also noted Transportation did not consistently record PM on ITS devices, including CCTV cameras and DMSs, within its performance measure reports.

Transportation identified a series of key performance indicators (KPIs) to tie to its budget. Transportation managers were responsible for quarterly reporting on the KPIs. We reviewed the following KPIs that were relevant to the audit for FY 2018 and the first three quarters of FY 2019:

- Traffic signal PM
- Traffic signal timing
- CCTV PM
- DMS PM
- Transportation investigation completion

Although the 2018 Public Works Department Strategic Plan stated traffic signal PM would be completed once per year, Transportation adopted a goal of performing PM on all traffic signals at least once every two years for purposes of monitoring its KPI reporting. As a result, Transportation developed a goal to perform PM on 16 traffic signals per month in order to perform PM on 384 traffic signals over a two-year period.

By comparing the actual traffic signal PM to the goal, we determined Transportation completed PM on 169 of a scheduled 192 traffic signals, or 88%, during FY 2018. We reviewed the first three quarters of data in FY 2019 and determined Transportation completed PM on 96 of a scheduled 144 traffic signals, or 67%.

In addition, the quarterly performance reports listed no DMS PM in FY 2018 and in the first three quarters of FY 2019. PM was reported on only 6 of 171 CCTV cameras, or 4%, in FY 2019 and

33 CCTV cameras in FY 2018. A total number of CCTV cameras was not provided for FY 2018. Transportation management confirmed maintenance was completed on all DMSs and CCTV cameras during the audit period despite the lack of recording in the quarterly performance reports. Transportation did not establish monthly ITS PM goals, as it compressed all ITS PM into the span of one or two months.

The 2018 Public Works Department Strategic Plan provided the following levels of service for PM:

> *"**Dynamic Message Signs**: Preventative maintenance is done once per year….*
>
> ***Signals**: Preventative maintenance is done once per year (FDOT requirement is once every 2 years)….*
>
> ***Traffic Cameras**: Preventative maintenance is done once per year."*

The National Transportation Operations Coalition stated the following regarding the importance of traffic signal maintenance:

> *"The maintenance function supports the key strategy of field infrastructure reliability that leads to effective signal operations. A well-timed system must be accompanied by effective maintenance if it is to provide high-quality service to the motoring public."*

Transportation management noted multiple challenges to completing traffic signal PM. The FDOT increased the volume of required traffic signal PM significantly in recent years. Consequently, PM on an intersection that, according to management, once took one hour may take several hours now. Transportation is also using traffic signal technicians for new construction projects and repair work, which reduces their available time for PM work.

Transportation management stated the ITS PM was completed during the periods reviewed. However, the data provided by the associated manager was inadvertently omitted from the quarterly reports.

When PM is not performed at the required frequency, Transportation runs the risk of equipment issues remaining undetected and devices later malfunctioning. This could lead to traffic system inefficiency, traffic operator limitations, increased repair efforts, and potential safety concerns with the associated devices.

Incomplete KPI data deprives management of critical data necessary for decision-making. With no capability to identify potential maintenance concerns, management cannot oversee efforts to address those concerns.

We Recommended Management:

A. Develop a goal to catch up on traffic signal PM with the anticipation that staff currently involved in construction projects will be able to assume a greater role in PM responsibilities once those projects are complete.

B. Assuming it cannot adequately catch up on traffic signal PM, determine how many additional staff would be necessary to complete this effort and seek funding to fill the necessary position(s).

C. Consistently record ITS PM in the quarterly performance measure reports so the information is available for comparison against the established performance goals.

D. Amend the next Public Works Strategic Plan to reflect the two-year traffic signal PM goal.

Status:

A. **Implemented.** Management instructed its staff to complete traffic signal PM on at least 50% of all traffic signals annually and alternate the remaining 50% the following year according to FDOT standards. The annual traffic signal PM report management provided to the FDOT indicated approximately 61% of the total traffic signals in the County received PM in state FY 2021. This figure shows management is ahead of its scheduled goal to complete PM on all traffic signals in a two-year period.

B. **No Longer Applicable.** Management's transition of its PM program to a two-year cycle meant it was able to maintain with higher efficiency without hiring additional staff.

C. **No Longer Applicable.** Management is no longer reporting ITS PM in the quarterly performance reports because management analyzed and concluded that it reports many more performance measures than other groups in Public Works, and the ITS PM information is not relevant to the public. The ITS Construction & Network section supervisor currently keeps track of ITS PM progress using Microsoft Excel and Cityworks work orders. This data is no longer compiled and provided to management for the quarterly performance reports.

D. **Not Implemented.** The most recent Public Works Strategic Plan from 2019 still reflected the annual Traffic Signal PM goal. Public Works did not create strategic plans for 2020 and 2021. Public Works management intends to meet in October 2021 to discuss creation of the 2022 Public Works Strategic Plan. A strategic plan with incorrect information about the level of service for traffic signal PM creates the risk of the Public Works management and Transportation staff being misinformed of Transportation management's plan for traffic signal PM. We continue to encourage Transportation management to amend the upcoming strategic plan to reflect that traffic signal PM should be completed once every two years.

5. Intelligent Transportation System Installation Contractors Lacked The Required Technical Expertise.

Through discussions with Transportation staff, we noted instances of contractors installing ITS equipment improperly. Transportation did not always detect those issues until operational implementation. For example, Transportation noted the following types of issues:

- CCTV cameras that were not installed in an optimally secure fashion
- CCTV cameras installed with scratched domes
- CCTV cameras pointed at the sky or pavement
- Non-terminated wires in traffic cabinets
- Incorrectly installed connectors
- Inductive loop vehicle detection sensors installed backwards

Beyond these issues, Transportation noticed contractors attempting to substitute cable or fiber with imitation materials instead of providing the specified material. As a result, Transportation had to perform research to ensure the proposed material met the project specifications.

Transportation management said the installation contractors had a background in traffic signal installation and not ITS. As a result, they often lacked the required technical expertise to perform satisfactory ITS installation work.

Transportation had an inspector for ITS installation projects. However, discussions with management revealed he had several responsibilities in the agency, which demanded a large amount of his time. Therefore, his primary focus was on inventory and equipment specification management. Management stated it would continue to evaluate the use of in-house versus outside installation resources to determine the best return on investment.

Transportation should ensure all ITS equipment is installed in a quality, defect free fashion and is fully operational prior to implementation. This entails having a sufficient quality assurance and control program in place to proactively detect and correct installation issues.

We obtained the following relevant information from Chapter 12.11 of the Public Works Management Practices Manual published by the APWA:

> *"A quality assurance plan includes inspection and measurement procedures, which are needed to determine that final projects conform to established standards for design and construction."*

Chapters 13.3 and 13.5 of the Public Works Management Practices Manual stated the following regarding contractor qualifications and bid evaluation:

> *"A designated official is responsible for ensuring that contractors who, for any of a number of reasons, are not qualified to undertake the work will not perform public construction….*
>
> *In determining whether the bid or proposal is suitable, designated personnel should decide whether the bid or proposal is responsive, check to see whether it is provided on the form furnished, and see that it contains no exceptions to specifications or plans stated in the project proposal."*

Section 1.3 of the County Purchasing Policy & Procedure Manual stated the following regarding the award of bids:

> *"Awards shall be made to the lowest responsive and responsible bidder or offerer providing the best value whose bid or proposal complies with the specifications in all material aspects, requirements, or criteria set forth in the invitation to bid or request for proposals and/or is in the best interest of the County. The County may opt to refuse award of all bid/proposal responses if not in the County's best interest."*

Therefore, Transportation should put the County's best interest ahead of only price considerations.

Transportation solicited ITS installation contractors based on best price, which resulted in less experienced contractors being awarded the work. Moreover, the Transportation inspector had several duties, which limited his time to perform field quality control inspections.

Deficient work must be re-performed to correct workmanship issues that should have been caught at installation or additional supervision is required during the installation process to ensure proper completion. This results in a waste of agency labor, equipment, and material resources. In addition, incorrectly installed ITS equipment can lead to traffic disruptions or provide challenges to operators and engineers monitoring traffic flow.

We Recommended Management:

A. Perform a cost-benefit analysis to hire and train additional staff to complete ITS equipment installation projects in-house instead of soliciting a contractor to potentially save money and ensure quality work completion. If this proves desirable, management should seek the funding to complete the process to hire ITS equipment installation staff.

B. Create a quality assurance plan for the ITS installation projects, which should include specific inspection, measurement, and documentation requirements.

C. Explore the feasibility of hiring or reassigning existing staff to perform full-time ITS installation quality control inspections.

D. Assuming Transportation continues to solicit contractors to perform ITS project installation work, include specific technical skills commensurate with the ITS installation work in its scope of work so only capable contractors bid and receive awards.

Status:

A. **Implemented.** Management performed cost-benefit analyses determining contractors are the most feasible option for ITS installations, and Construction Management Division staff is the most feasible option for ITS inspections moving forward once the initial system build is complete. Management has shifted its focus to ensuring its staff is adequate in the operations and maintenance of ITS equipment.

B. **Acceptable Alternative.** Management revised the ATMS/ITS specifications and standards in April 2020 to provide greater clarification and eliminate conflicting information instead of creating a quality assurance plan specific to ITS installation projects. Individuals installing the equipment will rely on the approved updated specifications and standards, and management will verify the final product is in compliance. Management plans to augment future construction plans, processes, and contracts to add quality assurance plans when it considers them to be necessary for individual projects. The basis of the recommendation was for Transportation to create installation and quality control standards to reduce the occurrence of faulty ITS equipment installations. Since management improved the quality control of ITS equipment installations with updated ATMS/ITS specifications and standards, it has chosen an acceptable alternative to the recommendation.

C. **Implemented.** Management chose the Construction Management Division staff and consultants to perform ITS installation inspections. Management provides supplemental staff from its ITS Construction & Network and ITS Support sections to Construction Management to assist in the ITS installation inspections. Management remains attentive and responsive to ITS installation contractors' issues and questions through progress meetings.

D. **Acceptable Alternative.** Management's evaluation of contractors and providing performance evaluation reports to Purchasing at certain project milestones and/or at the completion of projects allows it to rate the ATMS/ITS contractors and assists Purchasing to determine if a consultant or contractor can continue work for the County. Ultimately, Purchasing has the authority to decide which contractors can perform work for the County. In addition, management recently updated its specifications and standard details to address previous deficiencies and conflicting information to assist in improved contractor performance. Although management did not update its scope of work, the

improvements made to evaluate contractors and provide improved project standards guidance represent an acceptable alternative.

6. Transportation Engineering And Design Did Not Collaborate Effectively With Operations On Traffic Equipment Installation Decisions.

During field observations with Transportation staff, we noted multiple instances of ineffective collaboration on equipment installation decisions. The Transportation Traffic Systems Engineering and Design section creates the layout of an intersection, which includes the placement of traffic signals, cabinets, and associated traffic and ITS equipment. Although having to operate the traffic and ITS equipment, the Transportation Operations section was not always engaged in equipment placement decisions.

The specific issues we identified related to the placement or installation of some CCTV cameras. The devices noted here are not considered all inclusive. Moreover, we did not review the placement and installation of all CCTV cameras and other traffic devices.

In one instance, Operations section staff indicated a CCTV camera at the intersection of Gulf to Bay Boulevard and Keene Road was installed in a poor location. Therefore, the camera did not provide the best viewing angle to Operations section staff monitoring traffic on Gulf to Bay Boulevard. Transportation management stated this was one of its first CCTV camera installations, and it implemented stronger coordination efforts during project design since that time.

While observing ITS support staff repairing ITS equipment, staff identified another CCTV camera at the intersection of Park Boulevard and Gulf Boulevard that was mounted on the back of a pole facing the side of the road. See camera positioned on top of the pole in the photograph on the right. Therefore, the pole itself obscured the field of view. In addition, a CCTV camera mounted above the cantilever sign structure on Park Boulevard west of 141st Street, although being installed in a good location, was installed using a pole mount. According to ITS support staff, the CCTV camera should have been installed using a parapet mount to enable a greater field of view. This would have allowed the camera to extend over the mounting pole.

Our discussions with staff generally reflected the opinion that operational considerations were not prioritized consistently when planning and designing intersections.

The ITE defined traffic engineering as follows:

> *"Traffic Engineering is the subdiscipline of transportation engineering that addresses the planning, design and operation of streets and highways, their networks, adjacent land uses and interaction with other modes of transportation and their terminals."*

Therefore, a key function of traffic engineering is to address both design and operational needs. The Federal Highway Safety Administration stated the following in its *Designing for Transportation Management and Operations* primer, dated February 2013:

> *"Effectively designing for operations involves the development and application of design policies, procedures, and strategies that support transportation management and operations. Considering operations needs during the design process requires transportation design professionals to work closely with those who have expertise in transportation operations, intelligent transportation, and transportation technology….*
>
> *Successful integration of [management and operations] considerations into the design process means that:*

- *Roadway and transit system infrastructure is designed to facilitate the needs of day-to-day system management and operations and meet transportation system performance targets for efficiency, reliability, travel options, and safety….*

Designing for operations improves the integration of operational considerations throughout the transportation project development lifecycle, resulting in better resource utilization, improved maintenance and asset management practices through enhanced collaboration, and effectively designed and deployed infrastructure improvements….

Designers and project development staff typically have a thorough understanding of the project development process but have had limited exposure to operational needs. Without experience in the practical application of [management and operations] strategies, designers have no fundamental understanding of how their design may impact roadway operations… Building opportunities for operations, planning, project development, and design staff to regularly collaborate by removing functional silos from organizations will help to increase this understanding."

The Transportation Traffic Systems Engineering and Design section did not effectively consult with Operations section staff to ensure some CCTV cameras were positioned and installed to allow optimal viewing angles. Transportation management stated CCTV camera locations often appeared acceptable on paper. However, the locations were not always practical once implemented due to other unforeseen factors at the intersection.

Operations section staff had a limited field of view for the identified CCTV cameras. This impeded staff's ability to see all activity at the associated intersections.

We Recommended Management:

A. Obtain a list of specific equipment placement concerns from the Operations section and initiate a dialogue between the Traffic Systems Engineering and Design section and Operations section to resolve any concerns.

B. Re-emphasize communication efforts between the Traffic Systems Engineering and Design section and Operations section on the design and placement of traffic and ITS equipment at intersections. This could be accomplished through regular meetings between the two sections regarding ongoing and planned activities, as well as allowing Operations staff to test equipment placement in the field before design plans are finalized.

C. Incorporate a discussion of the necessary collaboration between the Traffic Systems Engineering and Design section and Operations section within its planned Transportation Design Manual.

Status:

A. **Implemented.** The Traffic Maintenance section and Operations, Planning & Engineering section, which are the current organizational sections, identified ITS equipment placement concerns. Planning and field reviews are required with representation required from both sections to minimize equipment placement issues on current and future projects. Traffic Maintenance and Operations, Planning & Engineering are members of the Public Works Project Production Team (PPT) review process. As PPT members, both sections are responsible for addressing significant issues relevant to current and future projects that need continuous attention. PPT members assist in the planning and designing of projects.

B. **Implemented.** The Traffic Maintenance section and Operations, Planning & Engineering section serve as members of the Public Works PPT review process on current and future projects. The PPT addresses significant issues that need continuous attention during the planning and design phases of projects. After Transportation uploads plan submittals to SharePoint for review, the Project Manager of each PPT requires all members to submit their comments or must confirm they have no comments in their areas of expertise by a specified deadline. The PPT review process encourages both Traffic Maintenance and Operations, Planning & Engineering to communicate with each other and other sections in order to aid in designing and completing projects.

C. **Implemented.** The Transportation Division finalized the Transportation Design Manual in January 2021. The manual was created for use by engineering professionals for the analysis, development, design, and implementation of improvements to County owned and maintained transportation facilities and infrastructure. Transportation incorporated in the manual the supplemental criteria for its sections to coordinate efforts to determine signalization features.

7. Municipalities Did Not Consistently Self Report Traffic Advisory Information.

During audit fieldwork, we identified an issue with the reporting of municipality traffic advisory information. The Operations section in Transportation creates a weekly Traffic Advisory Report (TAR) and distributes it each Friday. The TAR has evolved since its inception. It was initially a compilation of traffic advisories for only County roadways. However, Transportation realized the need to include traffic advisories on municipality roadways due to interconnectivity. Consequently, Transportation staff began reaching out to other municipalities on a weekly basis to solicit their traffic advisories for inclusion in the TAR.

Transportation historically posted the electronic TAR on the Public Works webpage. However, it recently removed the report and transitioned to a graphical representation in the Blue Sky Road Closures application. Transportation staff enters the information from the TAR into the ArcGIS

application, which updates the Blue Sky Road Closures application hyperlinked from the Public Works webpage.

During audit fieldwork, we noted a significant lane closure that was not reported on the Blue Sky Road Closures application. Specifically, Clearwater performed a utility repair on eastbound Court Street west of Hillcrest Avenue beginning on June 3, 2019. On May 17, 2019, the Clearwater news and information webpage announced the closure, which was to begin on June 1, 2019. This lane closure was not reported on the TAR and, consequently, the Blue Sky Road Closures application.

Transportation staff is limited to the information provided by the municipalities. Through discussions with Transportation staff, we determined the eventual goal is for each municipality to report its own traffic advisories in ArcGIS instead of relying on Transportation to compile. Clearwater and St. Petersburg currently use the ArcGIS application, so they are capable of reporting their own advisories.

Citizens rely on accurate and current traffic advisory data for decision-making. The collection of traffic advisory information should be a coordinated effort between the County and municipalities to reduce the likelihood of omissions and expired advisories. Therefore, each agency should have dedicated staff to enter traffic advisories and should be accountable for providing current and accurate traffic advisory information for each jurisdiction.

Clearwater did not report the lane closure on Court Street to Transportation. Therefore, the lane closure was not reported in the TAR or Blue Sky Road Closures application. Transportation staff reviews the FDOT traffic advisory webpage on a routine basis. However, it does not actively review the Clearwater webpage for traffic advisory information.

The manual nature of the current traffic advisory reporting process increases the likelihood of omissions or expired traffic advisories. Moreover, lack of coordination between the County and municipalities results in a reduction of information available to citizens. Less information limits the ability to efficiently plan travel.

We Recommended Management:

A. Formulate a plan to coordinate with all capable County municipalities so they can begin entering their own traffic advisory data in ArcGIS. Transportation should continue to compile traffic advisories for municipalities that do not have access to ArcGIS.

B. Actively review municipality traffic advisory webpages for relevant advisories and update the TAR accordingly until the self-reporting of municipality traffic advisory data is achieved.

Status:

A. **Partially Implemented.** Transportation contacted County municipalities and offered them access to the County's ArcGIS to input traffic advisory information, but the County municipalities have declined the offer to date citing they already record the information in their own systems. Transportation partially implemented this recommendation by expanding the access of the County's ArcGIS to allow capable County municipalities to input their traffic advisory information. Transportation uses the same method as observed during the audit to obtain County municipality TAR reports and input them into the County's ArcGIS. The manual nature of the current traffic advisory reporting process increases the likelihood of omissions or expired traffic advisories. Moreover, a lack of coordination between the County and municipalities results in a reduction of information available to citizens. Less information limits the ability of citizens to create travel plans efficiently. We continue to encourage management to fully implement this recommendation by continuing to encourage municipalities to enter their own traffic advisory data in ArcGIS.

B. **Acceptable Alternative.** Transportation has regular contact with the municipalities during preparation of the weekly TAR report. Municipalities have begun reporting their traffic advisory information weekly to Transportation on a more consistent basis. Therefore, Transportation decided not to review the municipality traffic advisory webpages. We consider this an acceptable alternative since it achieves the goal of having more complete traffic advisory information.

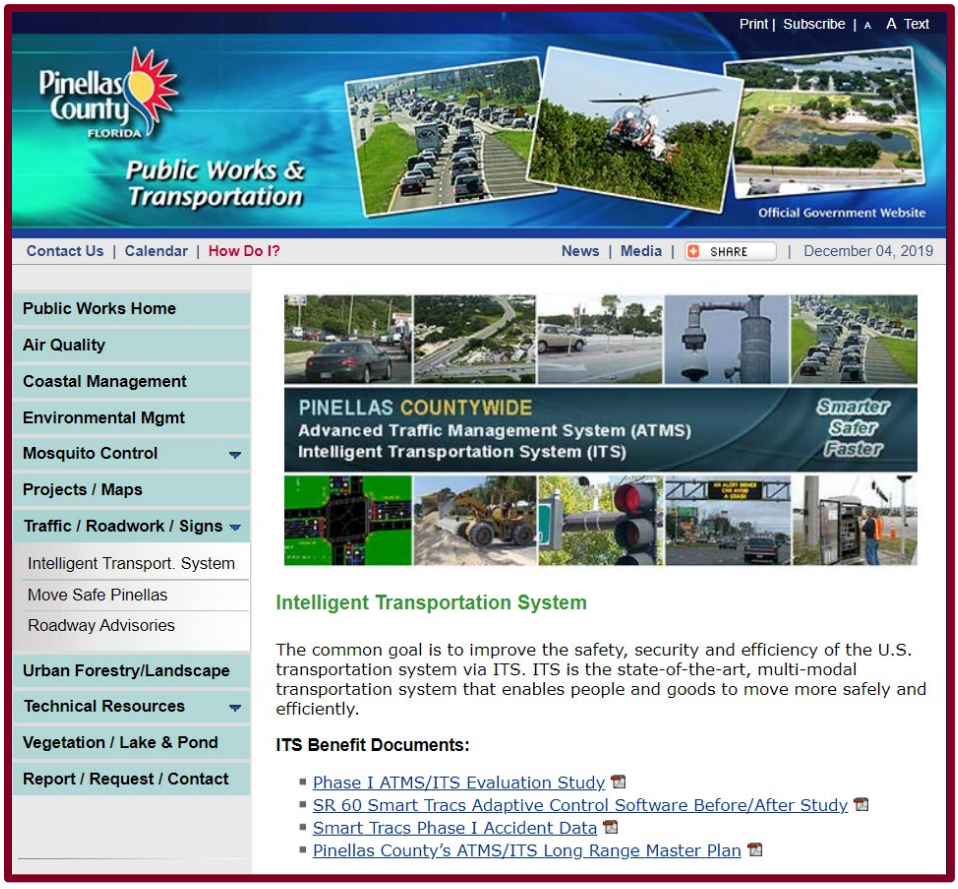
8. The Traffic Management Webpage Was Outdated And Contained Insufficient Public Outreach Information.

The ATMS/ITS webpage contained outdated content and limited information on the function of the ATMS/ITS and TMC. In addition, the webpage did not provide the implementation status of the ATMS/ITS or direct contact information for the TMC.

Among other duties, the TMC operators are responsible for answering citizen telephone calls. Citizen calls may relate to concerns about traffic equipment or traffic signal timing. In addition, citizens may request improvements, such as additional signage, new traffic signals, speed bumps, etc. The current ATMS/ITS webpage does not adequately explain the types of concerns or requests citizens should report to the TMC. It also does not provide a direct means of contacting the TMC. A citizen would need to perform additional research on other Public Works webpages or call the main Public Works telephone number in an effort to be redirected to the TMC.

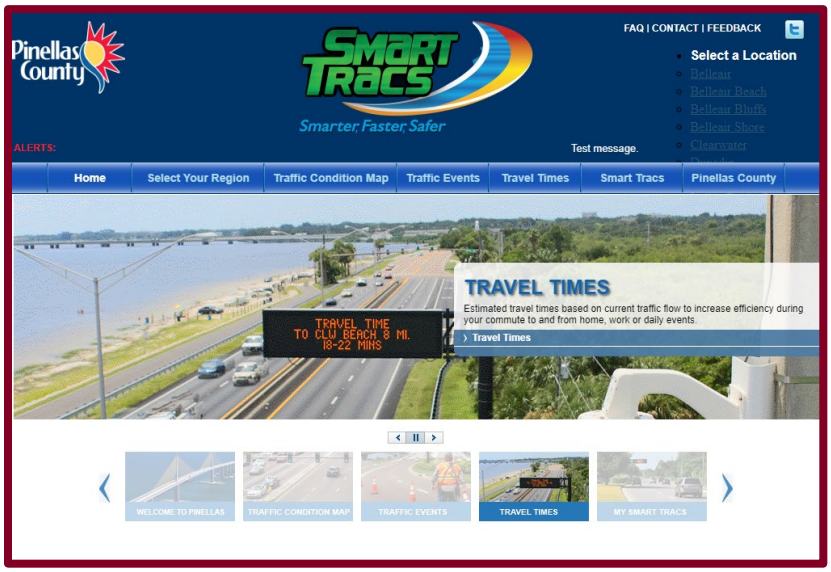
We also noted the ATMS/ITS webpage contained traffic study data from 2006 through 2008. These studies were performed on specific roadway corridors after the implementation of adaptive signal control to show the comparative benefit to time-based coordination. Similar studies were performed in 2012 and 2017. However, those studies were not included on the webpage.

Transportation management stated it created new content for the webpage and was in the process of obtaining approval to update it when OTI and Business Technology Services (BTS) advised against it due to pending litigation. Specifically, someone filed a lawsuit against the County claiming the County's website was not compliant with the Americans with Disabilities Act (ADA). A consultant is currently working to review the County's website to ensure all webpages are brought into compliance with the ADA. This must occur prior to Transportation receiving approval to proceed with updating its ATMS/ITS webpage.



In conjunction with the upgrade of the ATMS/ITS webpage, Transportation intends to publish the Smart Tracs ATIS webpage. The ATIS is designed to provide the public various traffic resources such as the following:

- Travel time information
- Construction data
- Incident data
- Special event data
- Weather data
- CCTV camera feeds
- DMS content



Once the new ATMS/ITS and ATIS webpages are implemented, Transportation plans to initiate a media campaign to publicize the new webpages and overall ATMS/ITS and TMC functionality.

A *Neighborhood Traffic Management Plan* published by the Washington State Department of Transportation and the Seattle Department of Transportation stated the following regarding the importance of public outreach:

> *"Public outreach is essential for any transportation project or traffic management program."*

Regarding the importance of information exchange, the International Association for Public Participation listed the following as one of its Core Values for the Practice of Public Participation:

> *"Public participation provides participants with the information they need to participate in a meaningful way."*

As the ATMS/ITS technology continues to advance and the implementation progresses on additional roadway corridors, it is more imperative the webpage be kept current to keep citizens informed. Additionally, citizen reporting of traffic issues and requests is critical to the operation and continual improvement of the traffic management system. Therefore, the TMC contact information should be readily available to the public.

Transportation saw the need to update its ATMS/ITS webpage and actuated the process to do so. However, ADA compliance issues with the County's website put the project on hold.

Without current and complete information on the ATMS/ITS webpage, citizens are ill informed of the functionality of the ATMS/ITS and breadth of operations in the TMC. Citizens also do not know what concerns they should report and to whom.

Addressing citizen concerns is a primary responsibility of the TMC. The information provided not only has the potential to improve the driving experience for the citizen reporting it, reported

information ultimately may improve the effectiveness and efficiency of the entire traffic management system, thereby benefiting more citizens.

We Recommended Management:

A. Work with OTI and BTS to obtain approval to update the ATMS/ITS webpage to include, at a minimum, the following information:

- Functionality of the ATMS/ITS and TMC
- Relevant statistics on ITS devices and coverage of roadway corridors
- Current status of the ATMS/ITS implementation
- List of reportable citizen traffic concerns
- Direct contact information for the TMC, including Transportation's Twitter account
- Most recent traffic studies regarding adaptive signal control

B. In conjunction with the ATMS/ITS webpage update, implement the Smart Tracs ATIS webpage.

C. Complete a media campaign to inform the public once the new ATMS/ITS and ATIS webpages are implemented.

Status:

A. **Partially Implemented.** The static ATMS/ITS webpage now includes current information on Smart Tracs, the ATMS/ITS network, and some relevant details about the ATMS/ITS system, including contact and social network information for the TMC. However, the ATMS/ITS static webpage does not include relevant ITS device statistics, current adaptive signal control traffic studies, or the current status of the ATMS/ITS implementation. The partial update of the static ATMS/ITS webpage results in the risk of citizens being ill-informed of relevant statistical and status information about the ATMS/ITS implementation. We continue to encourage management to fully implement the recommendation.

B. **Not Implemented.** Technological limitations at OTI have halted the implementation of the Smart Tracs ATMS/ITS interactive real-time webpage. The primary source of concern is the Smart Tracs cameras, which would jeopardize the County's limited network bandwidth if access was given to the public. OTI is open to engaging with BTS and Transportation to develop a feasible design of the ATMS/ITS interactive real-time webpage that allows the public to access the Smart Tracs cameras without putting the County's network bandwidth in jeopardy. Since the ATMS/ITS interactive real-time webpage was not implemented, Transportation risks missing an opportunity to keep citizens informed about travel time information, construction data, incident data, special event data, weather data, CCTV camera feeds, and DMS content. We continue to encourage management to implement the recommendation by working with OTI and BTS to explore solutions to overcoming the noted limitations.

C. **Not Implemented.** Management updated its static ATMS/ITS webpage but was unable to establish the ATMS/ITS interactive real-time webpage due to technical issues cited by OTI. Management canceled the media and public outreach campaign and, in the meantime, is collaborating with the County's Marketing and Communications Department to post tweets to the County's Twitter account regarding active transportation projects and efforts. Assuming Transportation can work with OTI and BTS to facilitate implementation of the Smart Tracs ATMS/ITS interactive real-time webpage, we continue to encourage management to implement the recommendation by completing a media and public outreach campaign. Without the media and public outreach campaign, the public will be uninformed about the new ATMS/ITS tools available once the new ATMS/ITS interactive real-time webpage is fully established.

9. Transportation Should Continue To Employ All Predictive Technology Resources For Traffic Management.

Transportation used a traffic management software with the functionality to perform predictive analysis, but it was not actively employing this functionality. Transportation began using the Waycare application on July 17, 2018, to view data from numerous sources in order to stay abreast of roadway and traffic conditions. The current sources of Waycare data are as follows:

- Duke Energy power outage data
- 911 data
- National Oceanic and Atmospheric Administration weather data
- SeeClickFix issue data
- Waze mobile application travel data

Beyond merely providing current traffic data, Waycare has artificial intelligence (AI) capabilities to coordinate in-vehicle and traffic data to perform predictive analysis. This provides the potential for proactive traffic management and accident prevention, which ultimately can improve the efficiency of traffic movement and safety.

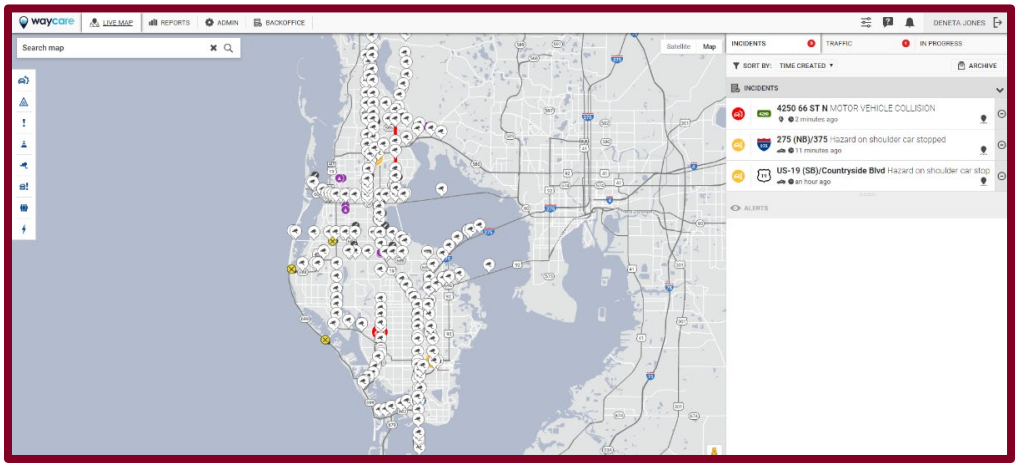
Waycare's predictive analysis functionality assembles historical traffic data and uses it to make an assessment of current driving conditions. Waycare uses an algorithm to assess accident risk based on certain conditions being met. For example, attributes such as rain, time of day, and location could signify a potential accident at that location.

Once Waycare detects a probable accident, it can perform other functions to prevent the accident. This includes posting safety messages to the DMSs and notifying the closest law

enforcement officers and first responders to monitor the location. Beyond accidents, Waycare has the capability to proactively report likely traffic congestion.

In order to realize the full potential of Waycare, there must be large amounts of data to assemble. Although Waycare currently accesses multiple data sources, more is needed. Specifically, Transportation needs to partner with local law enforcement, County Emergency Management, and County Fleet Management in order for them to authorize use of their automatic vehicle location (AVL) data. Shared location data is critical to the dispatch function to allow for quick response time.

Waycare is a secure application used by multiple state and local agencies, such as the FDOT and the City of Tampa. In addition, the Nevada Highway Patrol uses Waycare. AVL information shared with Waycare is confined to the application and not provided to the public.



Transportation should make every attempt to leverage technology to perform predictive analysis to improve traffic flow and safety. This technology will enhance the traffic management program and provide proactive functionality.

Transportation should also form partnerships with other County, local, and state agencies to obtain all required data.

According to an article in *The Wall Street Journal*:

> *"For AI to do its potential magic, the first thing that's needed is data. Lots of it."*

Transportation has only used the Waycare application for a short period of time and has been learning its functionality. Therefore, the opportunities to expand its use in predictive analysis have only recently presented themselves.

The more time it takes to partner with other agencies and obtain critical data, the more missed opportunities there are to improve the County's traffic flow and safety through predictive analysis technology.

We Recommended Management:

A. Assess and develop a list of its data needs in order to achieve its predictive technology goals in the Waycare application.

B. Engage other County, local, and state agencies, as applicable, to form partnerships and initiate data exchange through the Waycare application.

Status:

A. **Implemented.** Transportation continues to utilize the Waycare platform and implement additional data sources to refine the predictive technology based on its data needs. Waycare updated its application platform to version 2.0. Included in the update, Waycare added countywide historical traffic congestion and traffic accident data sources, and the Waycare application now generates alerts on all roadways.

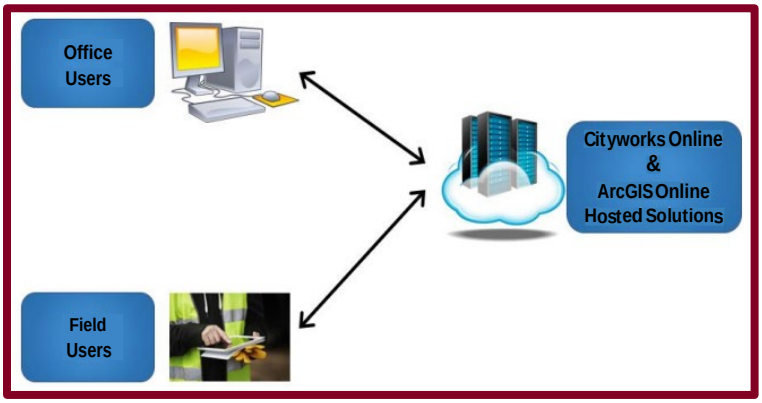
B. **Implemented.** Transportation initiated an effort to develop a data exchange through the Waycare application with the Pinellas County Sheriff's Office and Emergency Management. Transportation also collaborated with Hillsborough County and the City of Tampa in efforts to apply for a grant through the FDOT that would have been used to enhance regional technical capabilities and traffic management collaboration, which included incident management. Waycare was listed as a partner in the project proposal. Although the grant was not awarded to the agencies, the collaborative efforts toward improving traffic management while leveraging the Waycare application are evident.

10. Transportation Did Not Complete Its Roll-out Of Tablets And Associated Accessories To Field Staff.

During a ride-along with an ATMS/ITS technician, we determined he relied on manual notes and did not record work orders directly in Cityworks until the end of each work day. The ATMS/ITS technician indicated the tablet was difficult to use in the absence of a correctly positioned mounting device in the work vehicle. Therefore, he preferred to write his work notes in a notepad and transfer them to Cityworks at the end of each day using his tablet in the office.

We witnessed the technician manually write his work notes in the work vehicle, and he appropriately transferred them to Cityworks at the end of the day. The entire process only took a few minutes. However, the process was not as efficient as it could have been.

Transportation began using Cityworks for asset management on June 18, 2019. Transportation also purchased each field staff a tablet with access to Cityworks in order to record work orders. However, Transportation did not complete the roll-out of tablets to all field staff and ensure all appropriate accessories, such as cases and mounting devices, were provided.



The following benefits of tablet use were provided in an article on the Business.org website:

> *"Staying in the loop is crucial for offering customers the best possible service and for minimizing mistakes. When employees have tablets, they are always a few clicks away from accessing the pertinent data they need to perform their duties."*

Transportation should ensure staff has the most efficient access to technology to ensure the completion of job responsibilities. This includes completing the rollout of tablets and providing equipment to mount tablets in work vehicles to ensure easy accessibility. Each tablet should also be protected by an appropriate case considering the potential amount of wear and tear occurring in the field.

According to Transportation management, Transportation is still in the process of rolling out tablets to field staff. Management is also gauging how each of its functional groups uses the tablets. For example, some groups use the tablets strictly inside the work vehicle. Other groups will need to remove the tablets from the work vehicle to scan equipment barcodes or perform other functions directly on the equipment being repaired or maintained. Since cases and mounting devices can be very expensive, Transportation management did not want to purchase a large quantity to have only a fraction of them used.

The lack of quick access to Cityworks through the tablet creates the risk that work orders get recorded late or get missed if not manually recorded and transferred. This could lead to inaccurate records in the Cityworks application. In addition, although not consuming a large amount of time overall, compiling written notes and later transferring the information to Cityworks unnecessarily duplicates work.

We Recommended Management:

A. Complete the roll-out of tablets to its field staff.

B. Survey staff on the preferred tablet cases and mounting devices and purchase these items for permanent installation on the assigned tablets and in the assigned work vehicles.

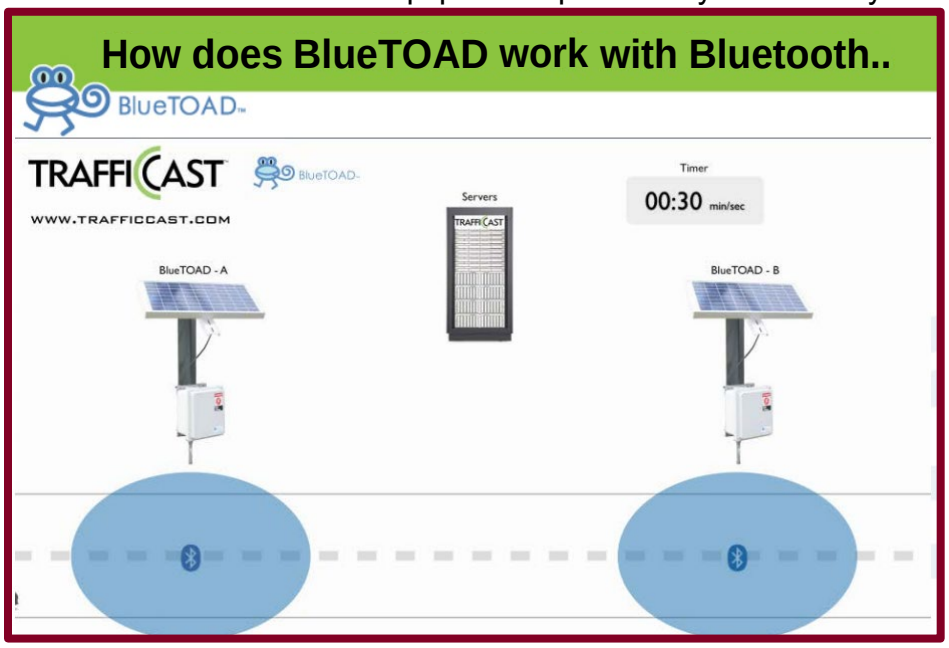
Status:

A. **Implemented.** Transportation completed its rollout of tablets to its field technicians.

B. **Implemented.** Transportation provided its field technicians tablet cases, charging cables, and docks and mounts for their vehicles, if requested. Replacements are kept on hand and are distributed by the designated Transportation staff upon request by the technicians.

11. Transportation Did Not Monitor Travel Time Performance On All Roadway Corridors With Monitoring Equipment.

Our review revealed Transportation did not monitor travel time performance on all corridors with installed monitoring equipment. In order to analyze travel time, Transportation uses the BlueTOAD Bluetooth travel time application. BlueTOAD sensors are installed on 50 roadway corridors that have traffic equipment operated by the County. The sensors locate and create Bluetooth connections to the unique media access control addresses assigned to motorists' vehicles or mobile devices and monitor the progression of the vehicles through the corridors. Using this information, the BlueTOAD application calculates the average travel time for all motorists on the corridor and displays it on DMSs.



A consultant began analyzing monthly BlueTOAD travel time data on a portion of the County roadway corridors in June 2018. Using this data, the consultant began compiling a monthly Arterial Performance Measures Report. The report examines the morning and afternoon peak period travel times for traffic in both directions in a corridor and assigns a travel time index and planning time index to each figure. The raw data and indexes provide a basis of comparison and allows the consultant to analyze trends and associated contributing factors.

Within the most recently provided Arterial Performance Measures Report from May 2019, the consultant analyzed 26 of the 50 corridors, or 52%, with installed monitoring equipment. Transportation management stated its goal was to begin in-house analysis of travel time on all corridors equipped with BlueTOAD travel time monitoring equipment.

Transportation should make every attempt to use the BlueTOAD travel time application to its fullest potential and compile travel time performance reports on as many roadway corridors as possible. This will provide the maximum amount of data for historical travel time analysis and create the potential for predictive analysis based on historical trends.

The FDOT stated the following regarding the importance of mobility and performance:

> *"Mobility is the ease with which people and goods move throughout their community, state, and world. Mobility is valuable because it provides access to jobs, services and markets. Transportation's most essential function is to provide mobility for people and goods. By measuring the performance of mobility, we can better understand how to improve it."*

The National Center for Mobility Management defined performance measurement as follows:

> *"Performance measurement refers to the routine measurement of program inputs, outputs, outcomes, and impacts related to an organization's mission, vision, goals, and objectives. By regularly monitoring program operations, a mobility management program can*
>
> - *Measure progress toward targets and goals*
> - *Engage in informed decision making*
> - *Guide operational changes that will eventually lead to better utilization of resources and improved outcomes"*

Transportation had only been reporting on travel time since June 2018. Moreover, construction projects and the continued expansion of the ATMS/ITS affected the availability of data in certain corridors. Transportation was also in the process of migrating its BlueTOAD data to a cloud

environment in partnership with the FDOT. Consequently, it placed a hold on its planned in-house travel time analysis efforts.

There is a missed opportunity to perform trend analysis on all of the roadway corridors operated by the County and equipped with travel time monitoring equipment. This information is vital to ensure the County's traffic is flowing as efficiently as possible while identifying potential areas of concern that need to be addressed operationally.

We Recommended Management:

A. Begin compiling monthly internal performance reports on all County operated roadway corridors equipped with BlueTOAD travel time monitoring equipment. This will provide a means of historical performance and future predictive analysis.

B. Make travel time performance reports available on the updated Transportation webpage so the public is aware of travel time performance and trends.

Status:

A. **Implemented.** Transportation has been producing and reviewing BlueTOAD Time & Speed Averages Reports each month via TrafficCast's BlueARGUS program. These reports allow Transportation to compare the average AM peak time frame versus the PM peak time frame for all 48 arterials. Transportation is in the process of migrating its BlueTOAD travel time data to a cloud environment, which will ensure all travel time data can be stored. Currently, Transportation has limited capacity to save data on its in-house server. Transportation revised the number of arterials from 50 to 48 during the data migration process.

B. **Not Implemented.** Although Transportation updated its static ATMS/ITS webpage, the update did not include adding the arterial performance reports to the webpage. Transportation's inability to make travel time performance reports available on the Transportation website hinders the transparency of travel time performance and trends presented to the general public. We continue to encourage management to implement the recommendation.

12. The Traffic Management Center Doors Did Not Always Lock Automatically.

The TMC, also known as the PCC, doors did not always close completely and lock upon entering and exiting the room. During audit fieldwork, we were able to enter the TMC without swiping an access card due to the doors not closing and locking properly.

The TMC is a secure, quiet area that requires authorized card access to enter. Upon exiting, motion sensors above the doors unlock them for exiting. This physical security control could be circumvented by an unauthorized person if the doors do not automatically close.

Transportation has other physical security controls in place, including a reception desk where visitors are required to report to the receptionist and sign a visitor log. However, if the receptionist leaves the desk for any reason, an unauthorized person can walk past the reception desk and enter the TMC if the doors are not properly closed. Badge access is required to enter the Public Works complex and the TMC building after hours.

The National Institute of Standards and Technology (NIST) is a national information technology authority. NIST Special Publication 800-171 provides physical security requirements. Chapter 3.10.1 provides the following requirements:

> *"Limit physical access to organizational systems, equipment, and the respective operating environments to authorized individuals."*

Chapter 3.10.5 further requires the following:

> *"Control and manage physical access devices."*

The two TMC doors rubbed together, which prohibited the locking magnet from activating if a person did not pull the doors closed.

An unauthorized person could enter the TMC and obtain access to critical transportation management hardware and software. This could lead to asset misappropriation, traffic system manipulation, and/or the observation of sensitive information.

We Recommended Management:

Repair the TMC door so it automatically locks upon entrance and exit.

Status:

Implemented. Transportation repaired the TMC door, and the TMC door closes and latches efficiently.

Division of Inspector General

Ken Burke, CPA

Clerk of the Circuit Court
and Comptroller
Pinellas County, Florida

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